

FIG. 1A
(Prior Art)

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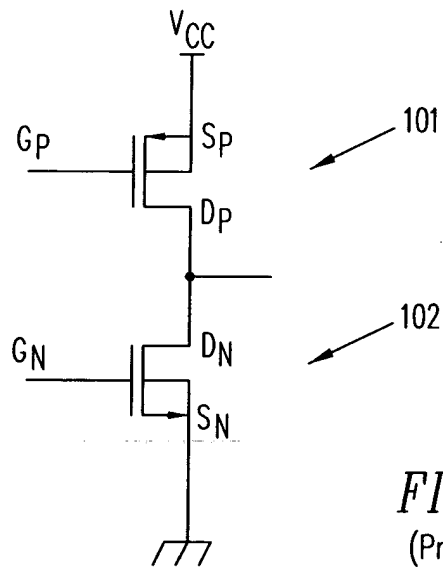


FIG. 1B
(Prior Art)

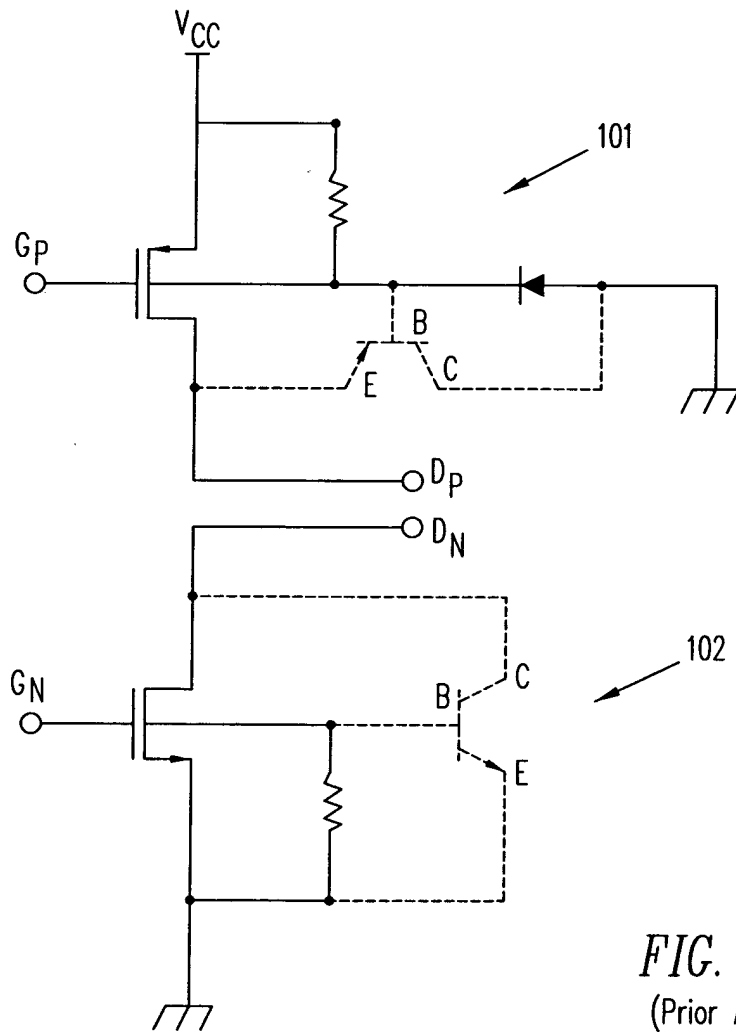


FIG. 1C
(Prior Art)

FIG. 2A
(Prior Art)

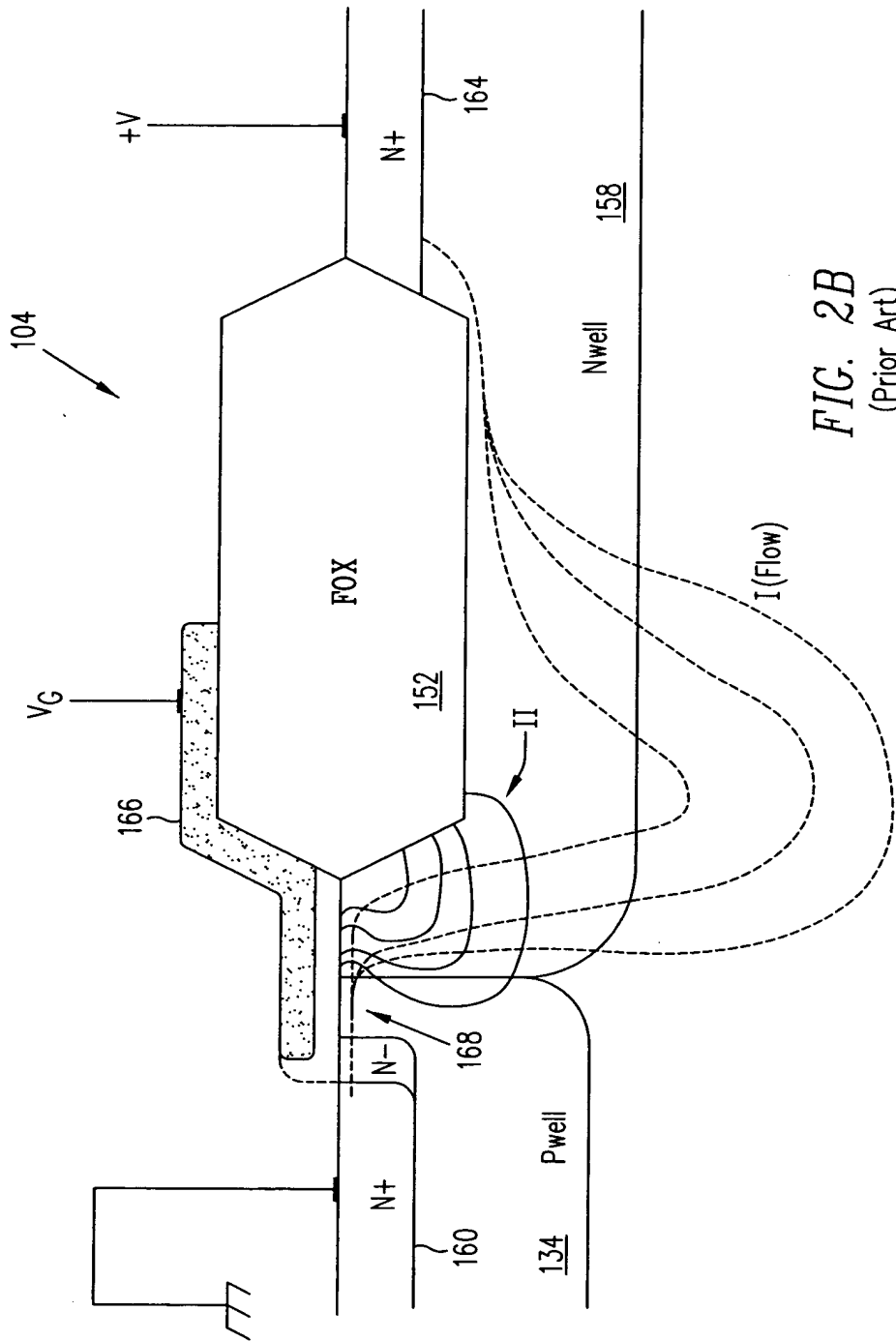


FIG. 2B
(Prior Art)

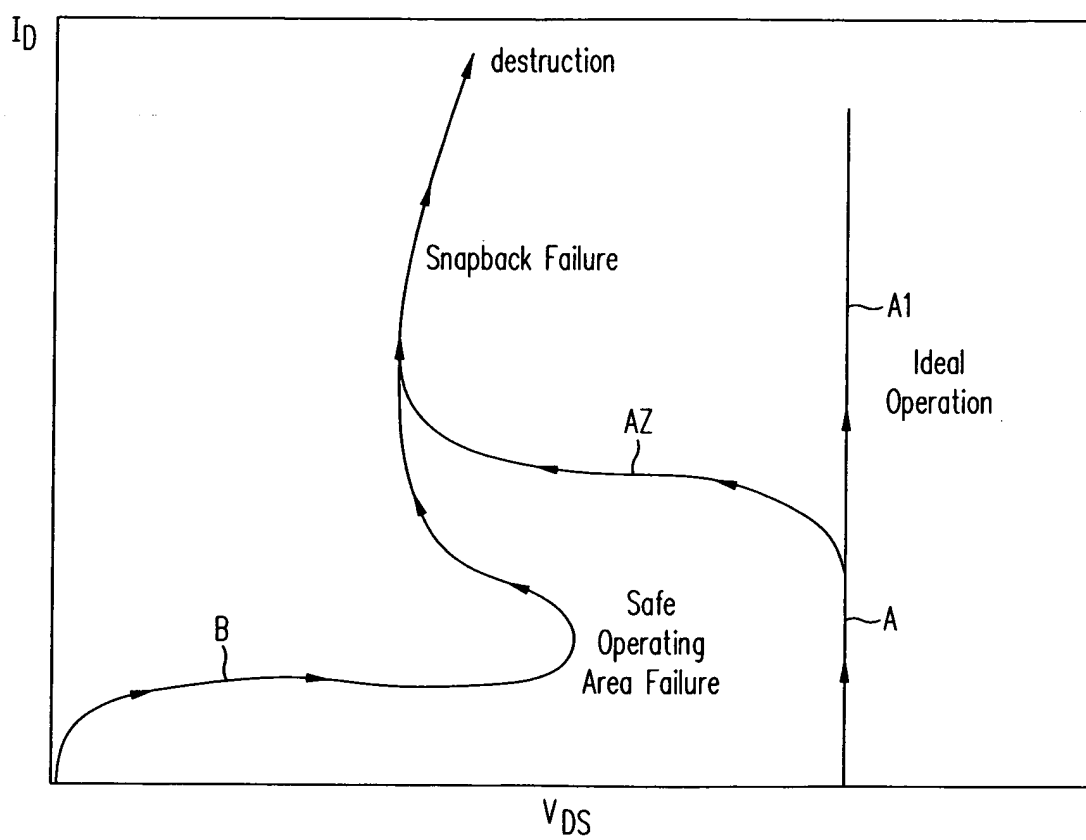


FIG. 2C
(Prior Art)

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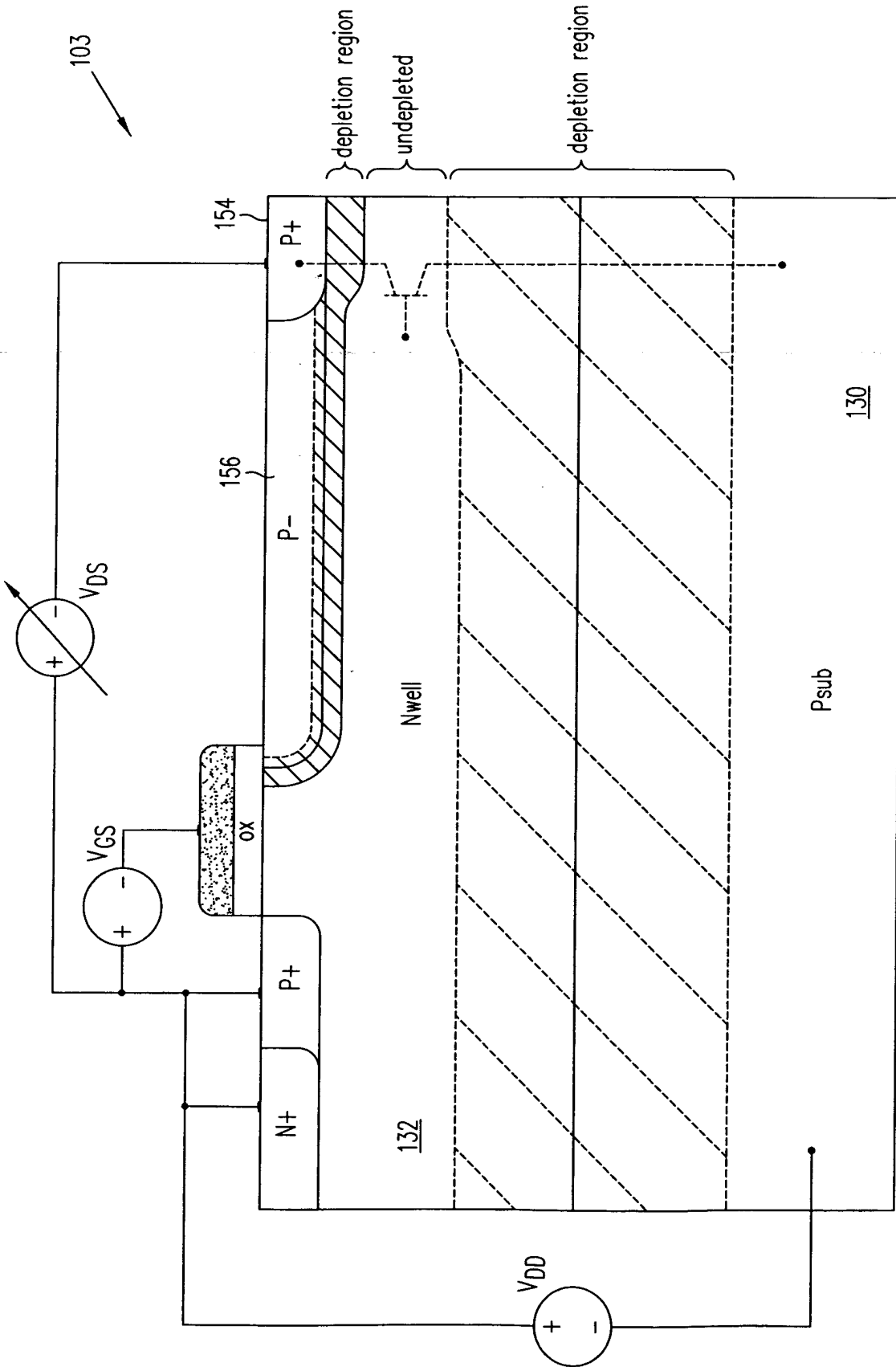


FIG. 2D (Prior Art)

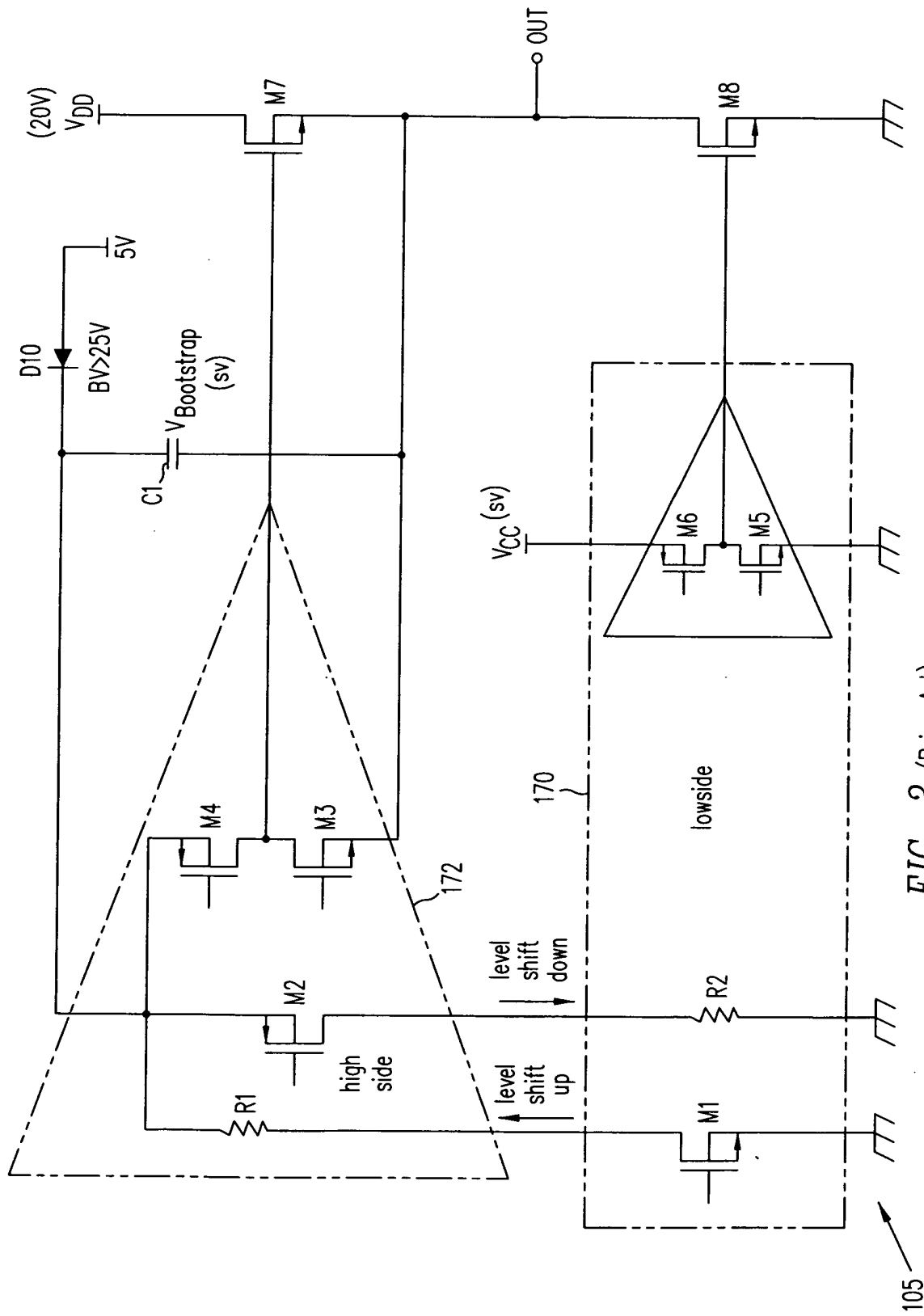


FIG. 3 (Prior Art)

FIG. 4A
(Prior Art)



FIG. 4B
(Prior Art)

FIG. 4C
(Prior Art)

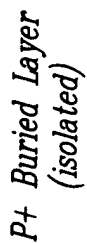


FIG. 5A

(Prior Art)

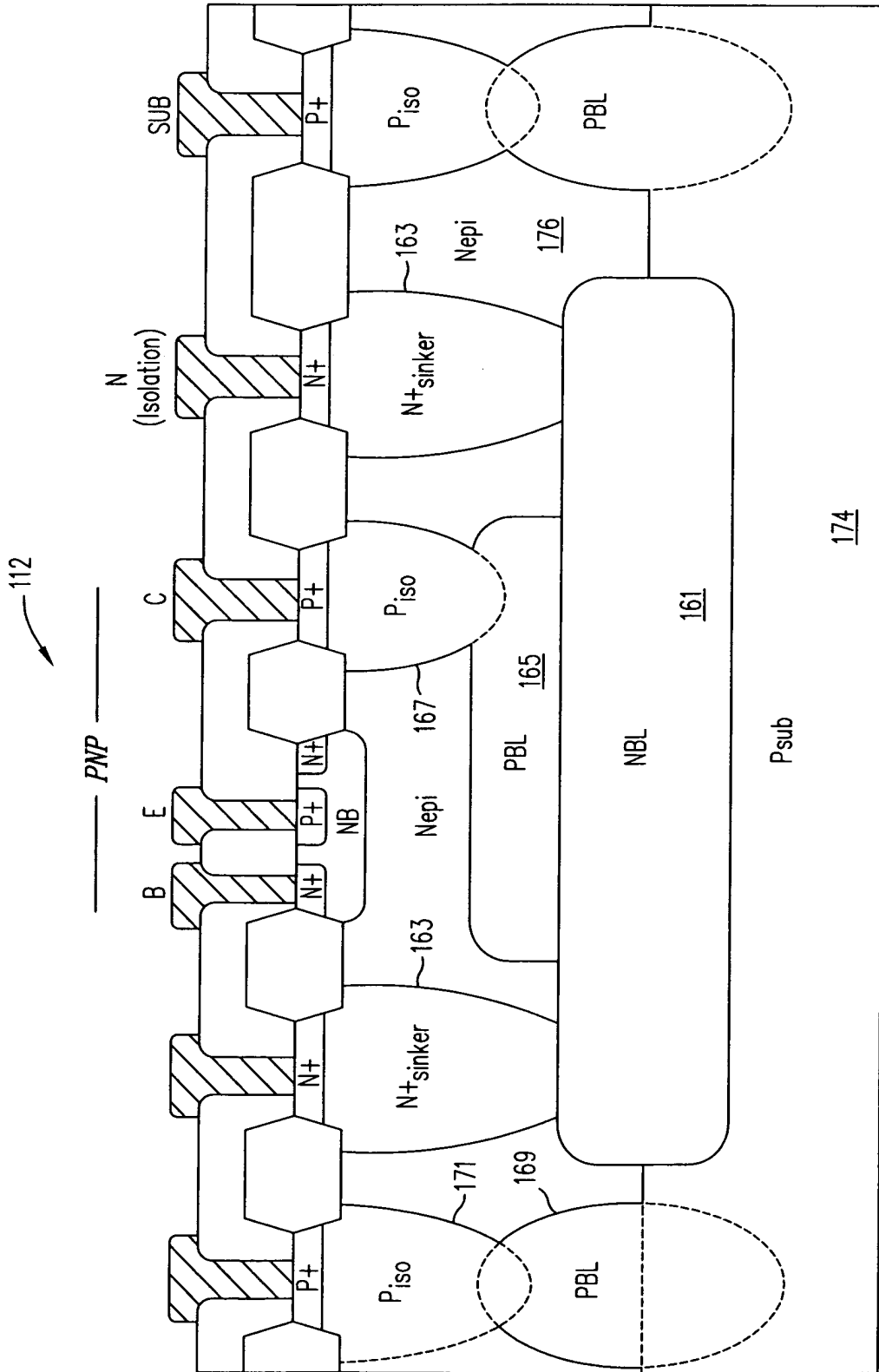


FIG. 5B
(Prior Art)

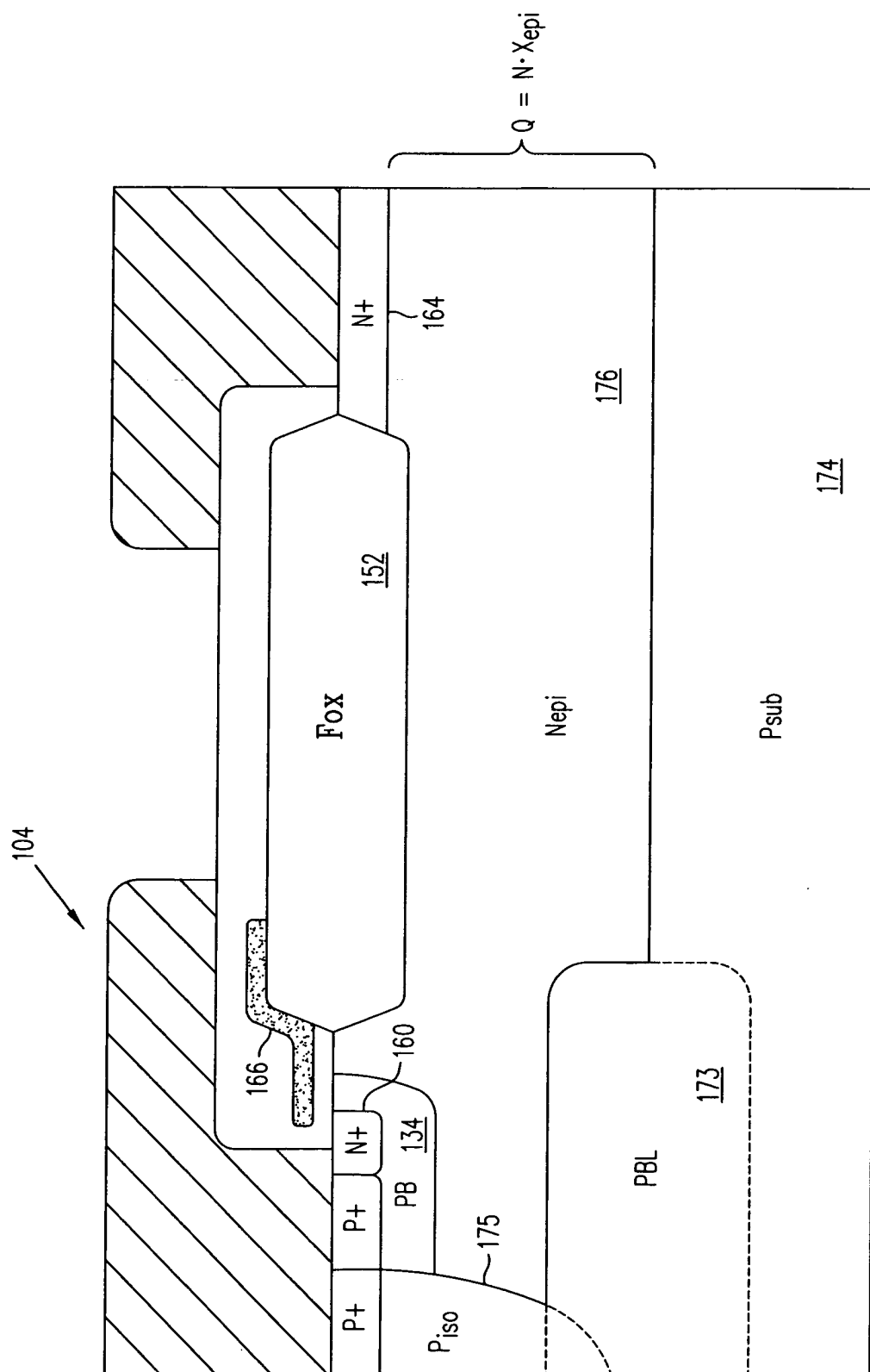


FIG. 5C
(Prior Art)

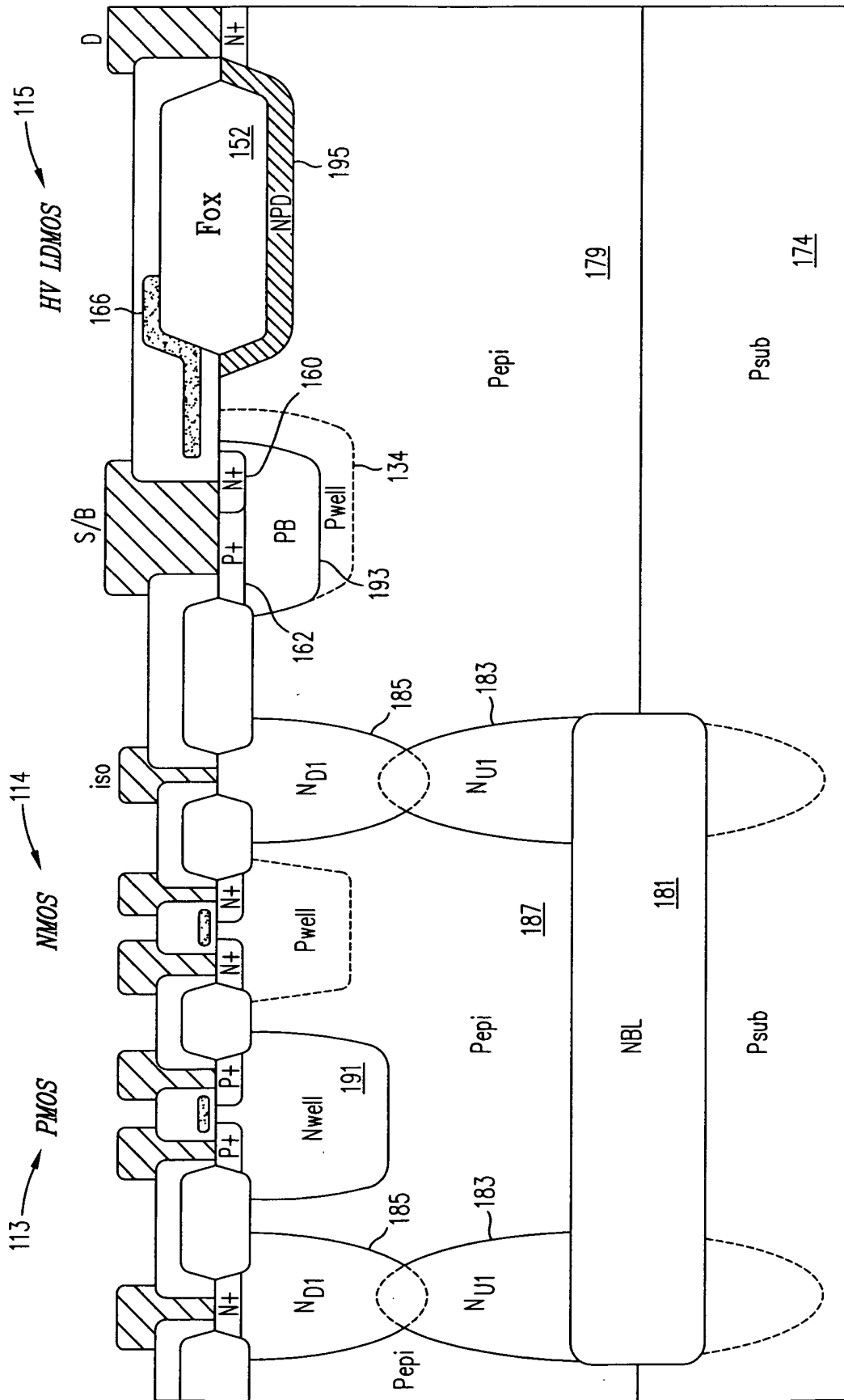


FIG. 6A (Prior Art)

FIG. 6B (Prior Art)

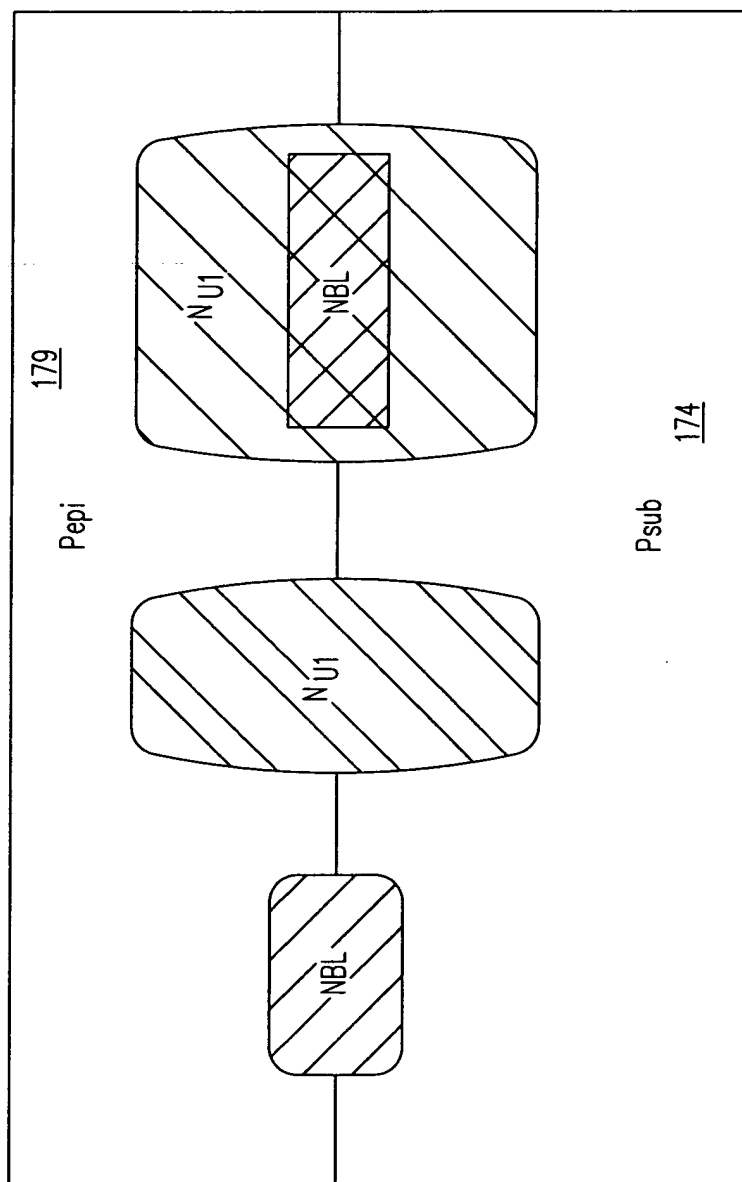


FIG. 6C
(Prior Art)

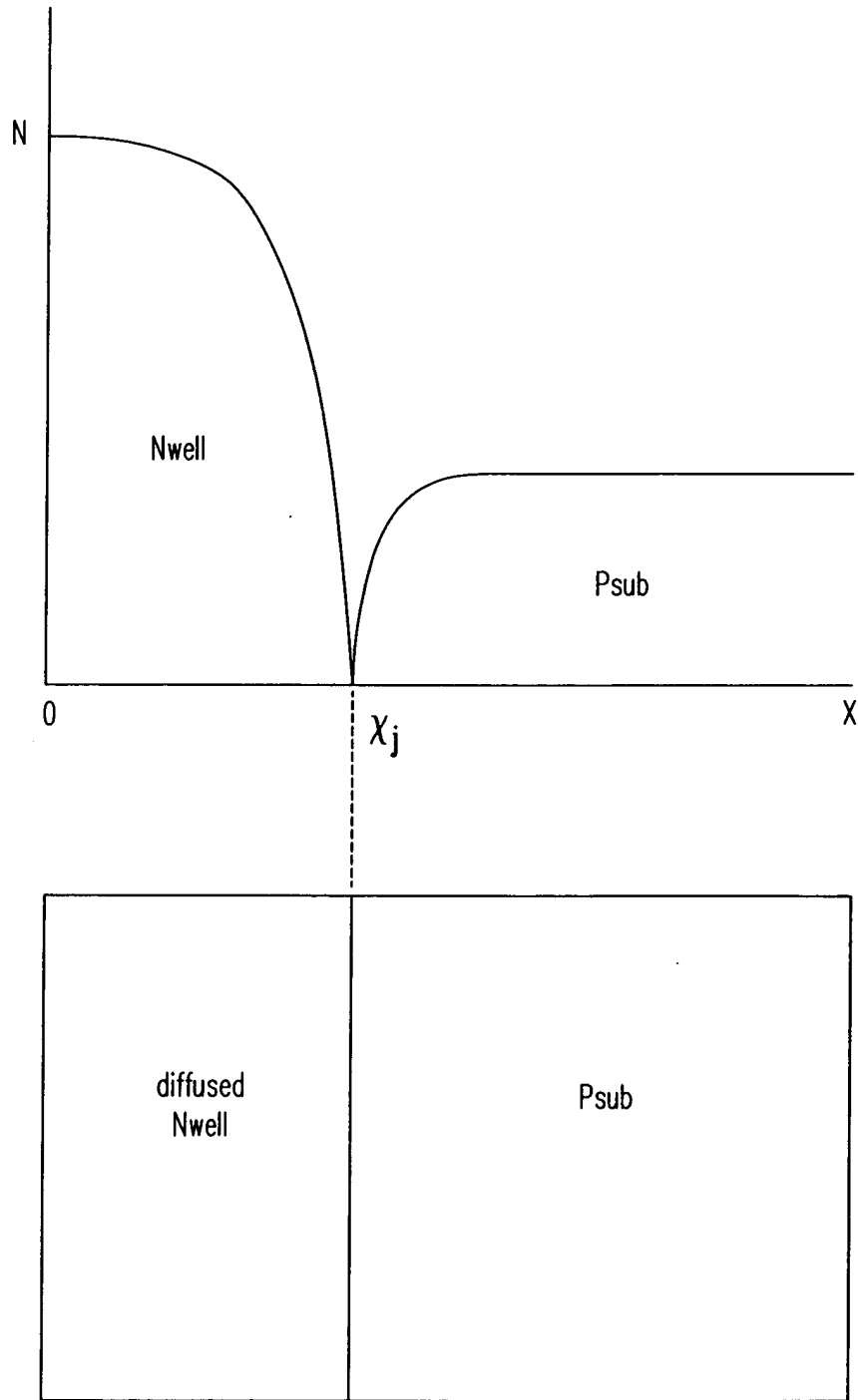


FIG. 7A
(Prior Art)

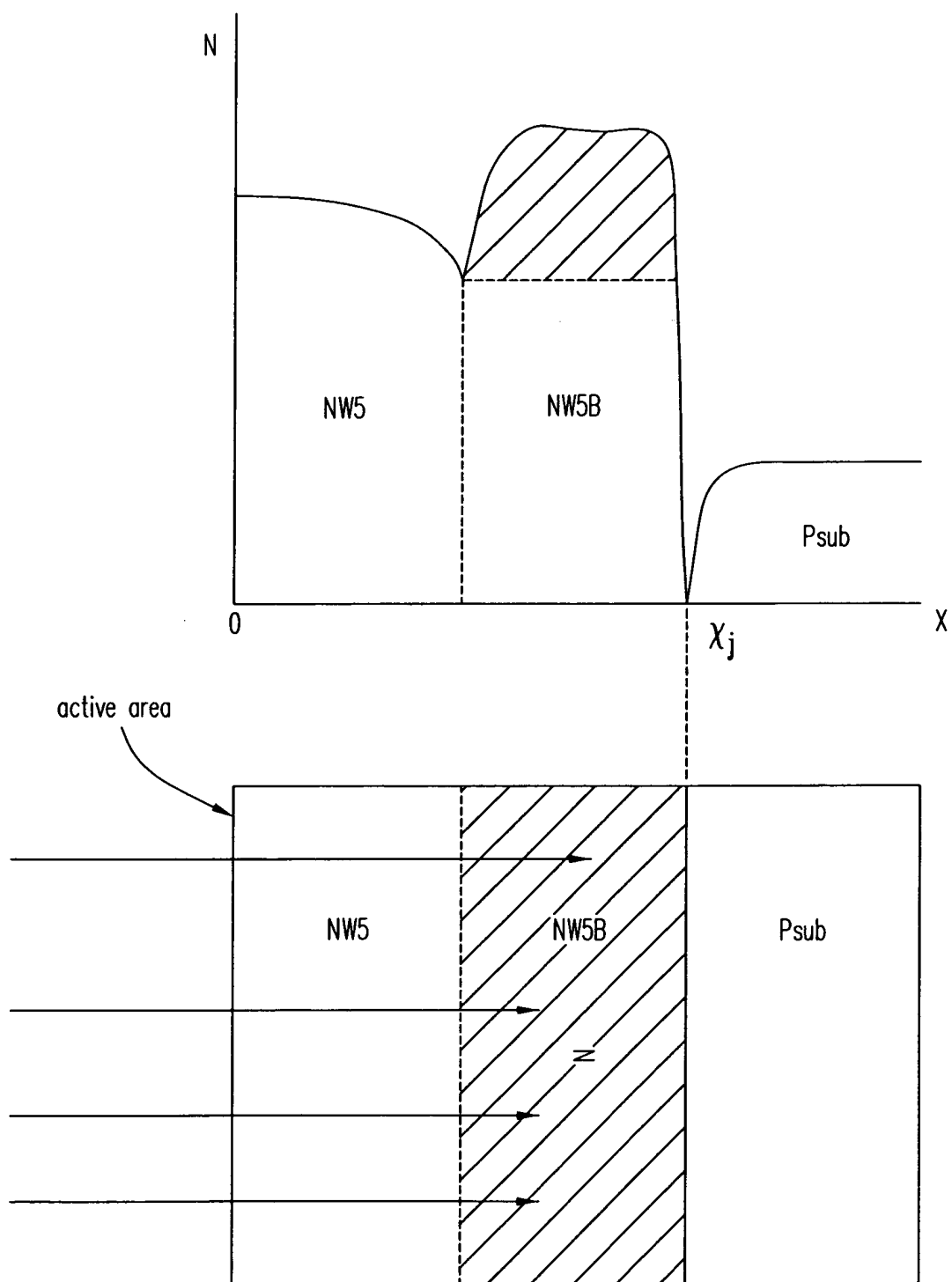


FIG. 7B

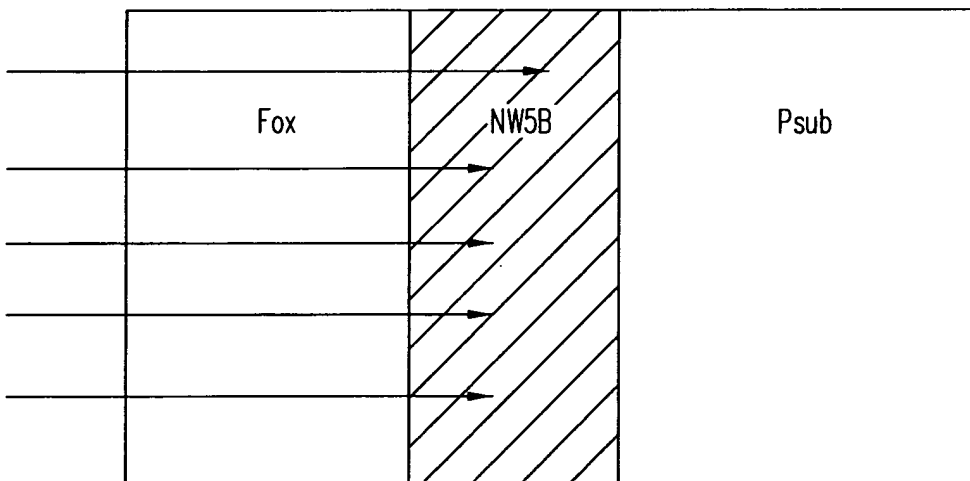
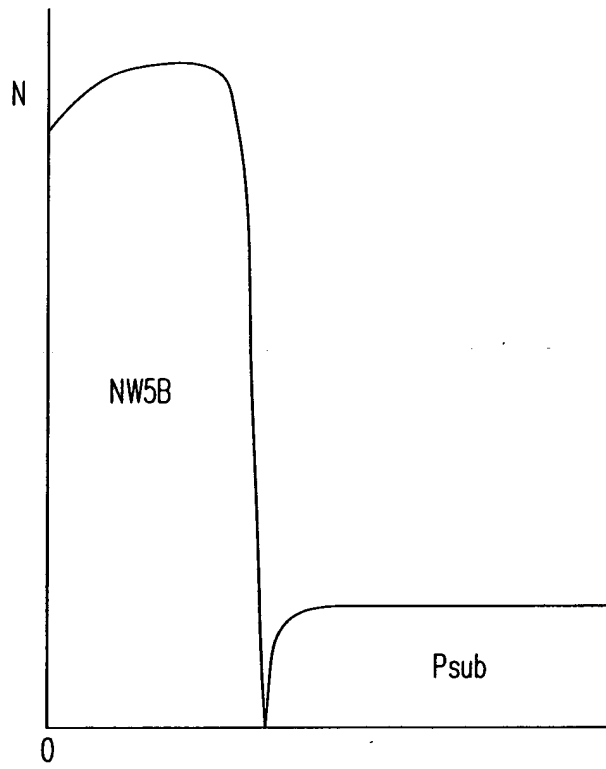


FIG. 7C

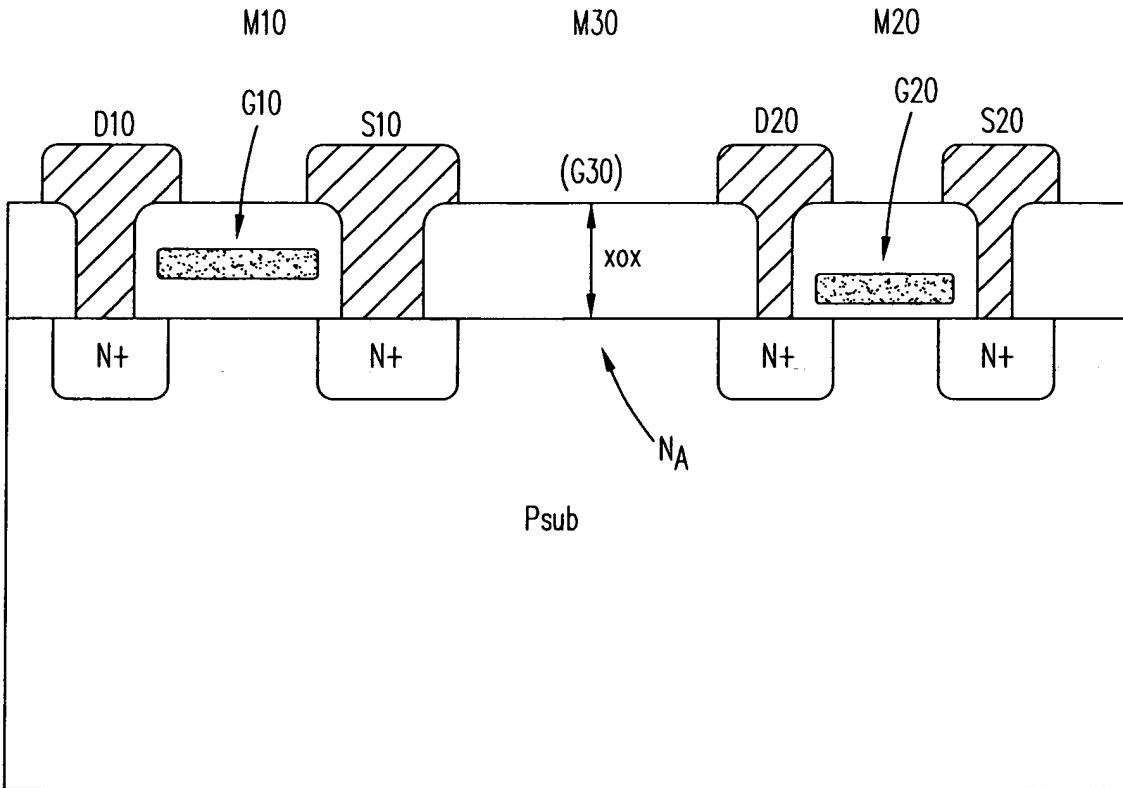


FIG. 8A

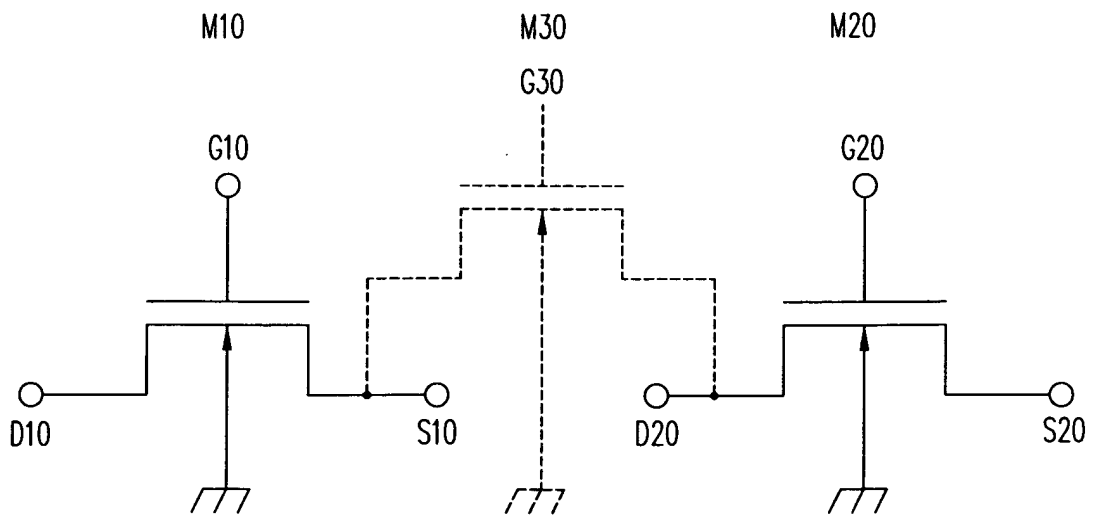


FIG. 8B

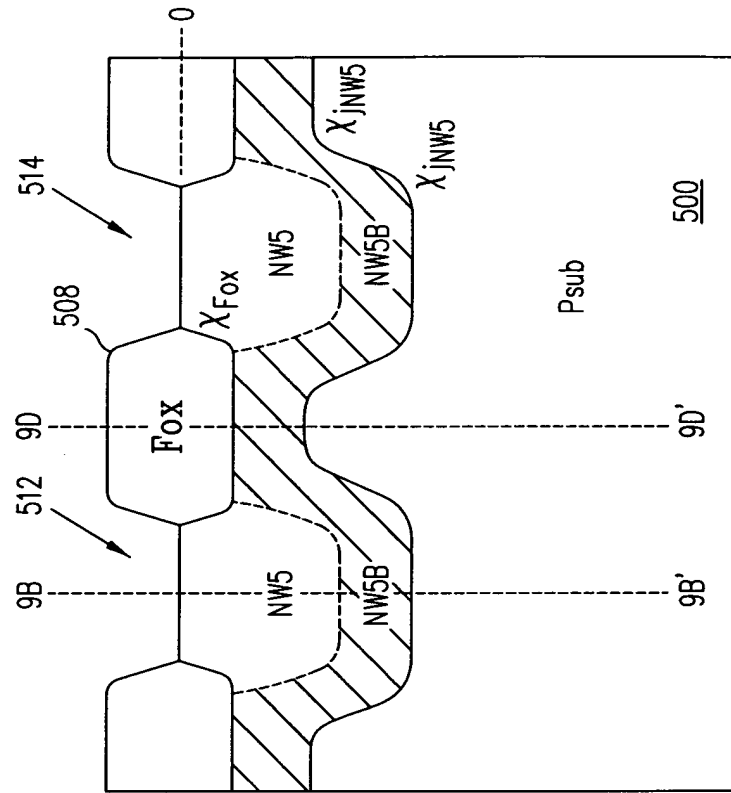


FIG. 9B

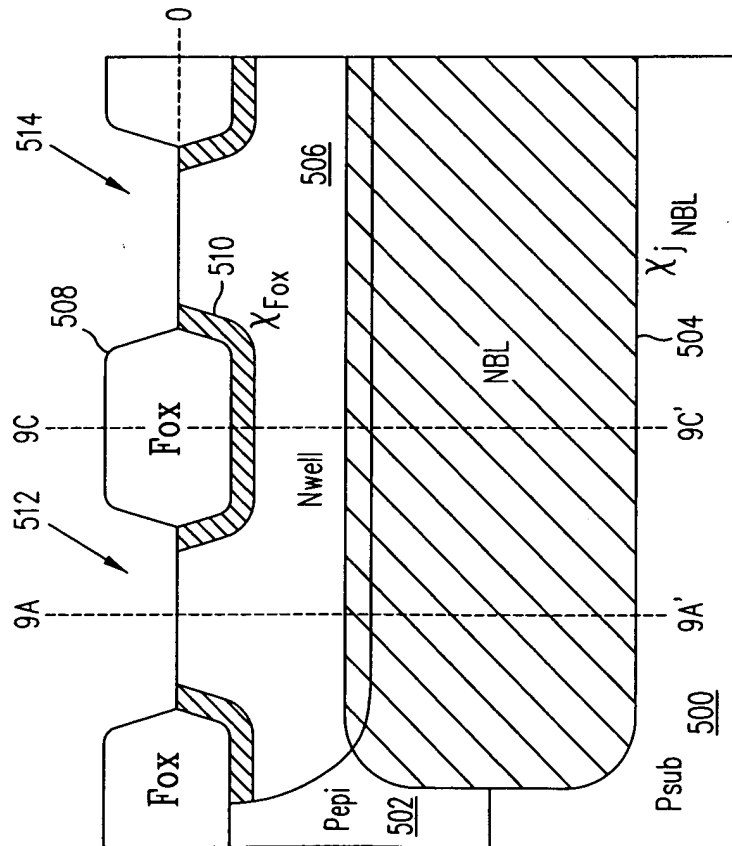


FIG. 9A
(Prior Art)

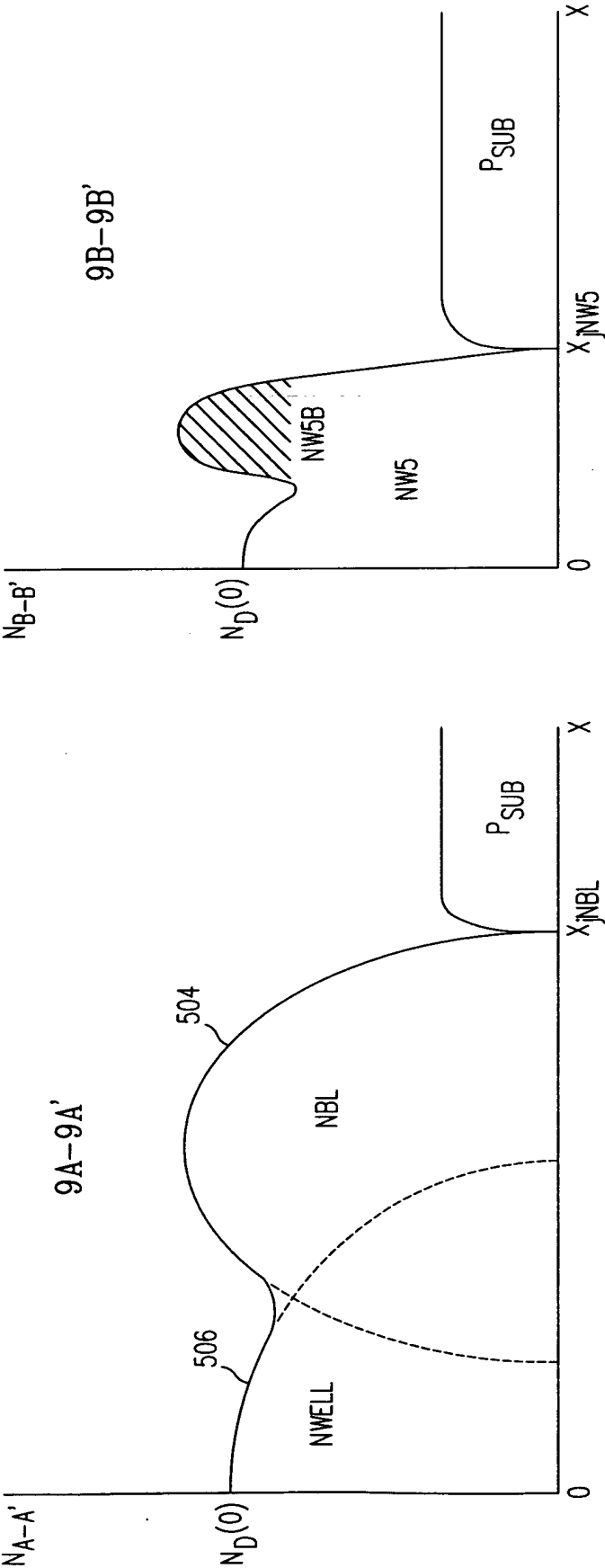


FIG. 9D

FIG. 9C
(Prior Art)

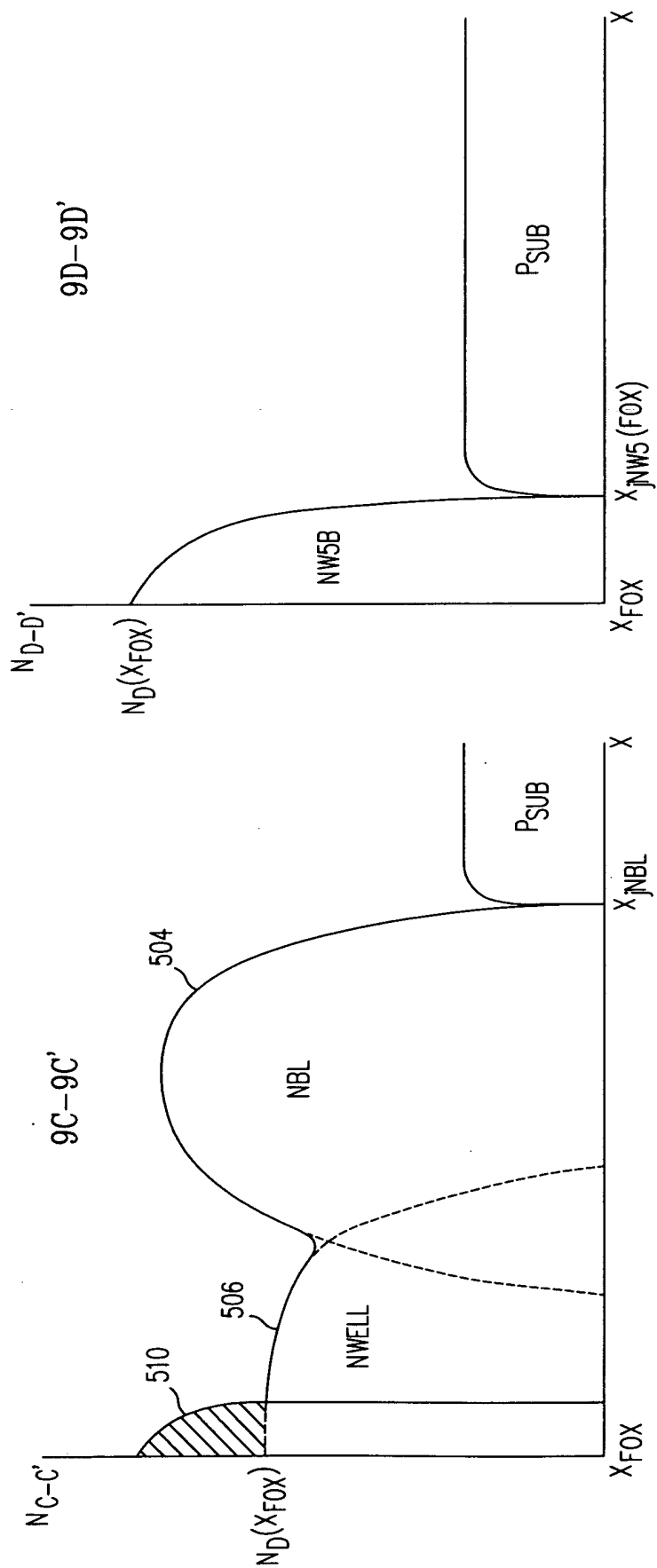


FIG. 9F

FIG. 9E
(Prior Art)

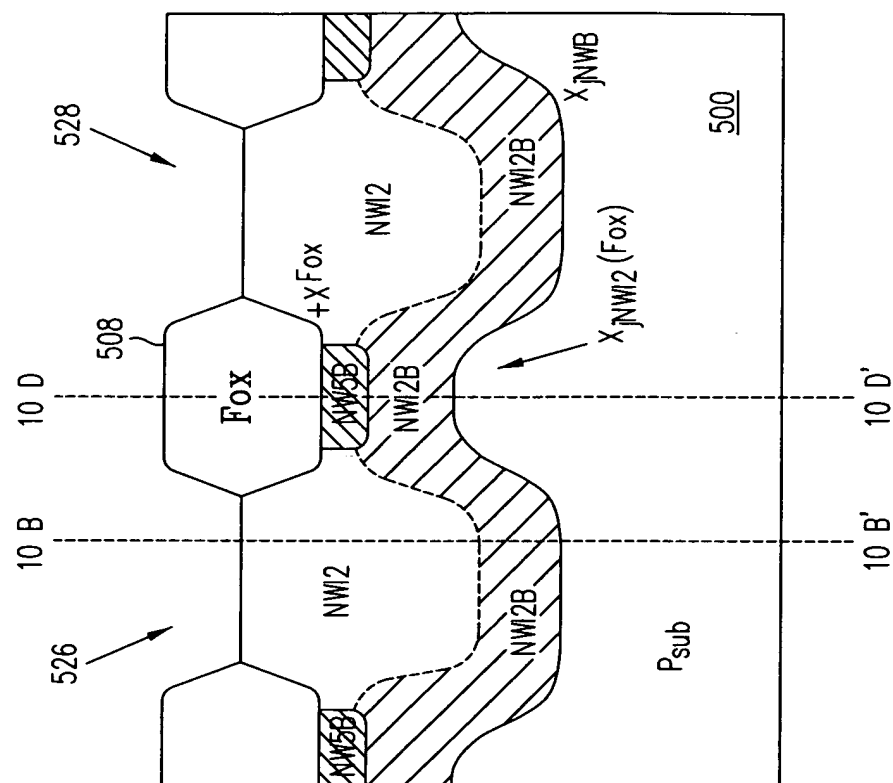


FIG. 10B

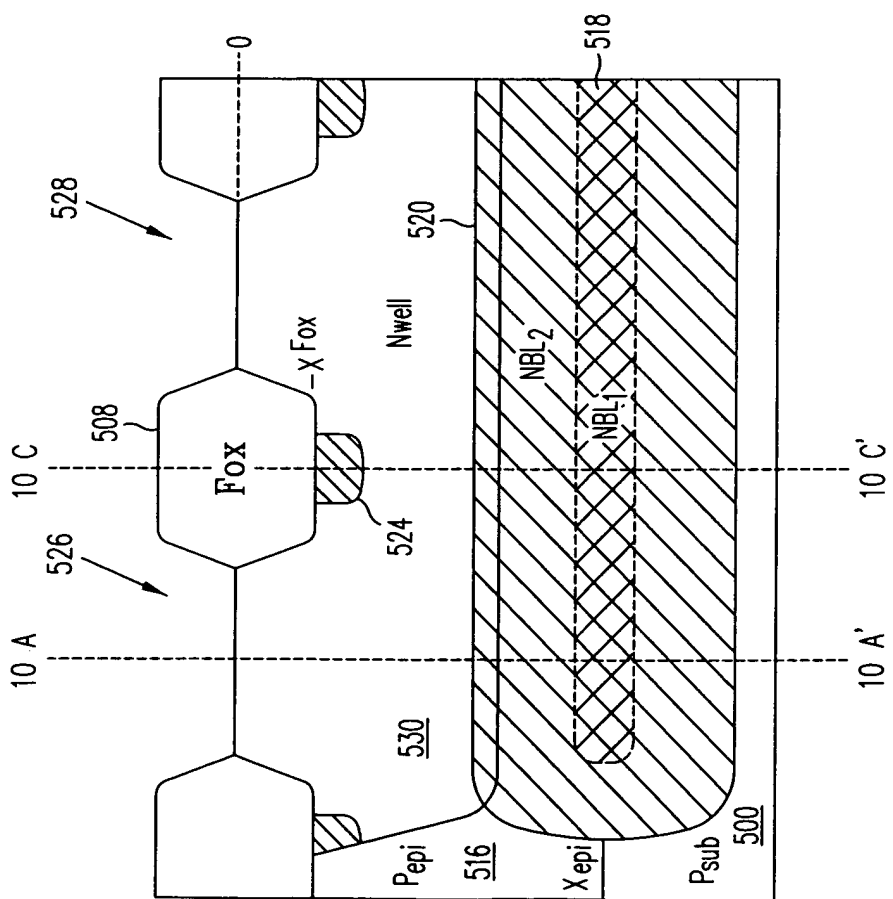


FIG. 10A
(Prior Art)

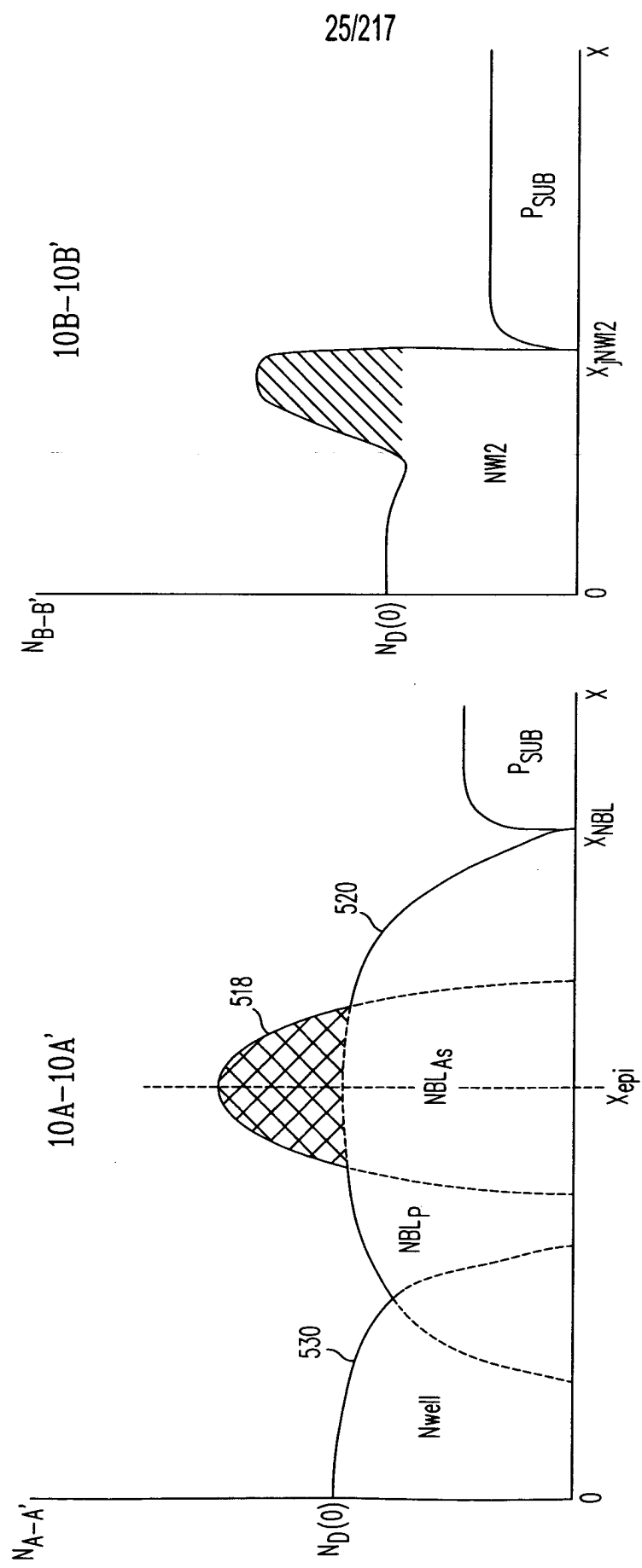


FIG. 10C
(Prior Art)

FIG. 10D

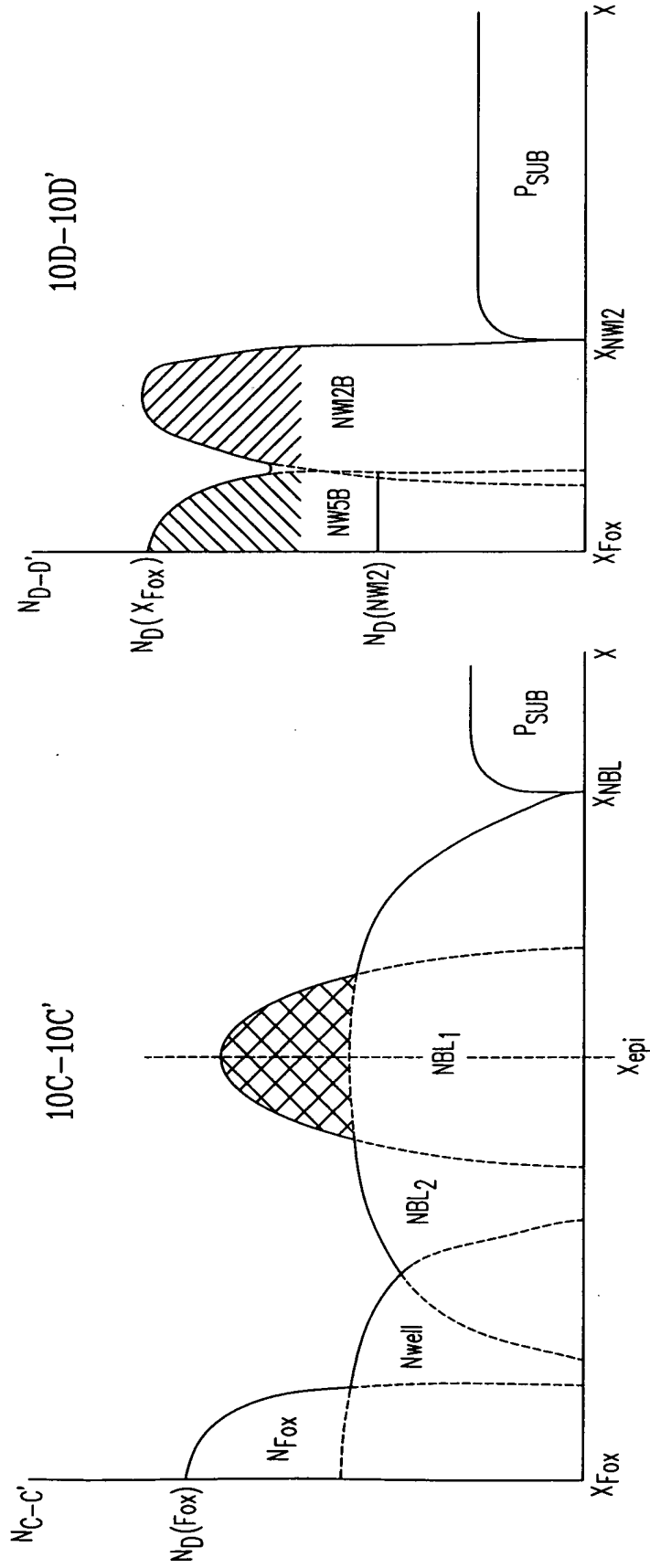


FIG. 10F

FIG. 10E
(Prior Art)

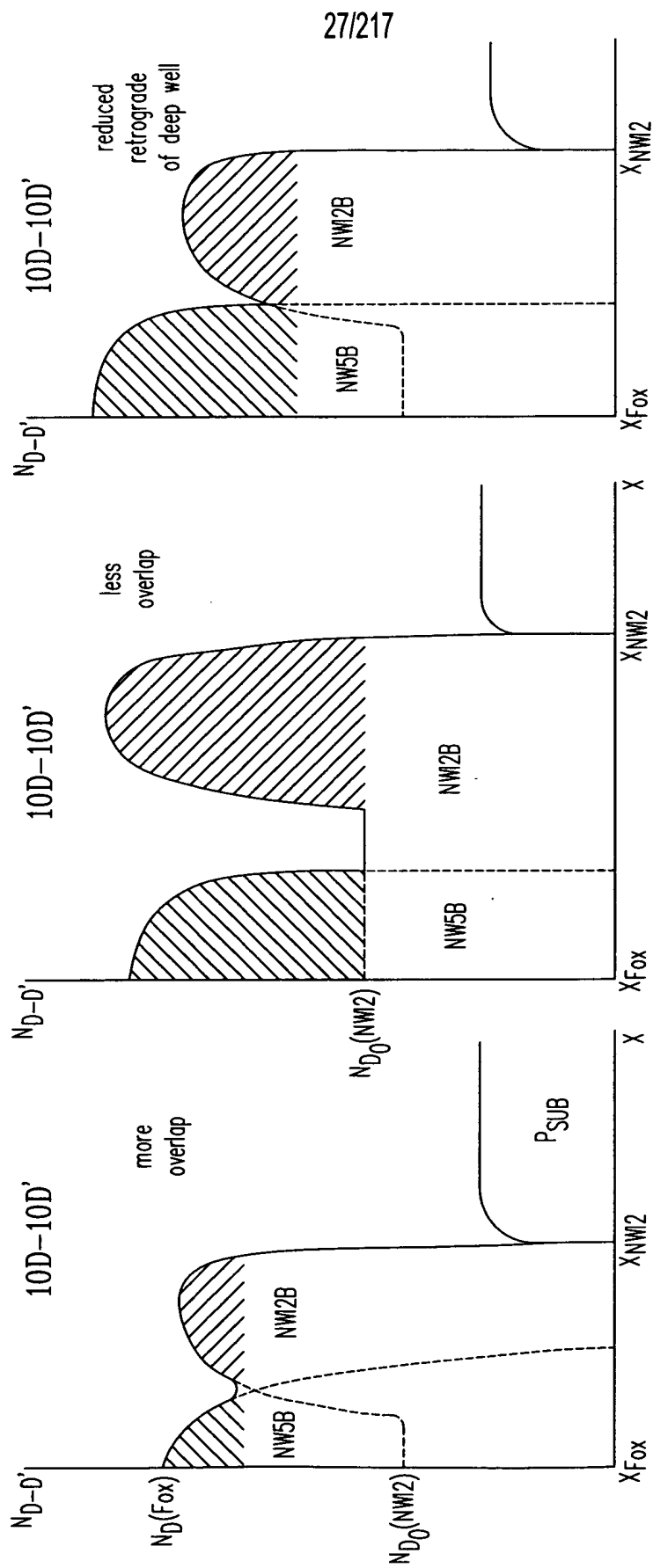


FIG. 10G

FIG. 10H

FIG. 10I

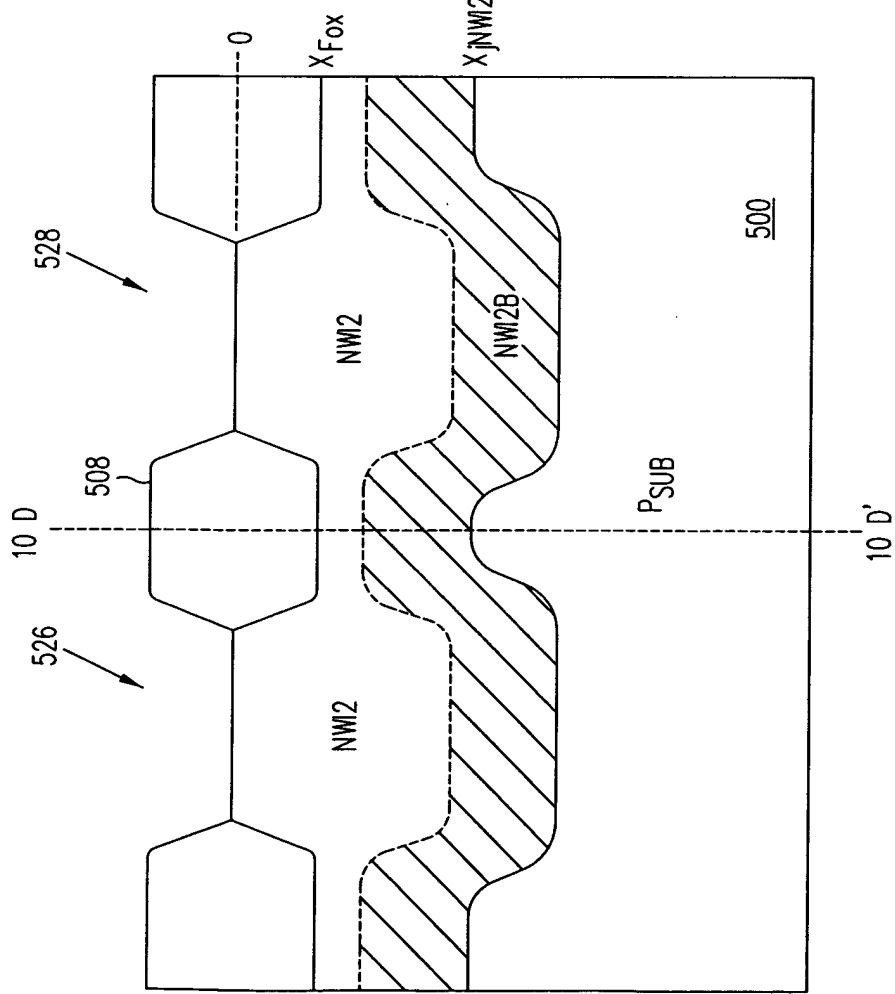


FIG. 10J

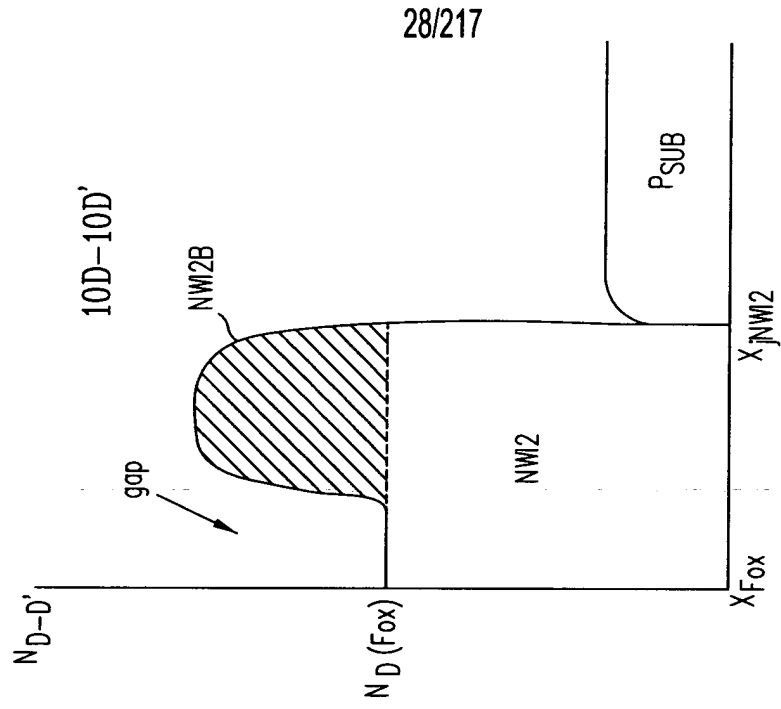


FIG. 10K

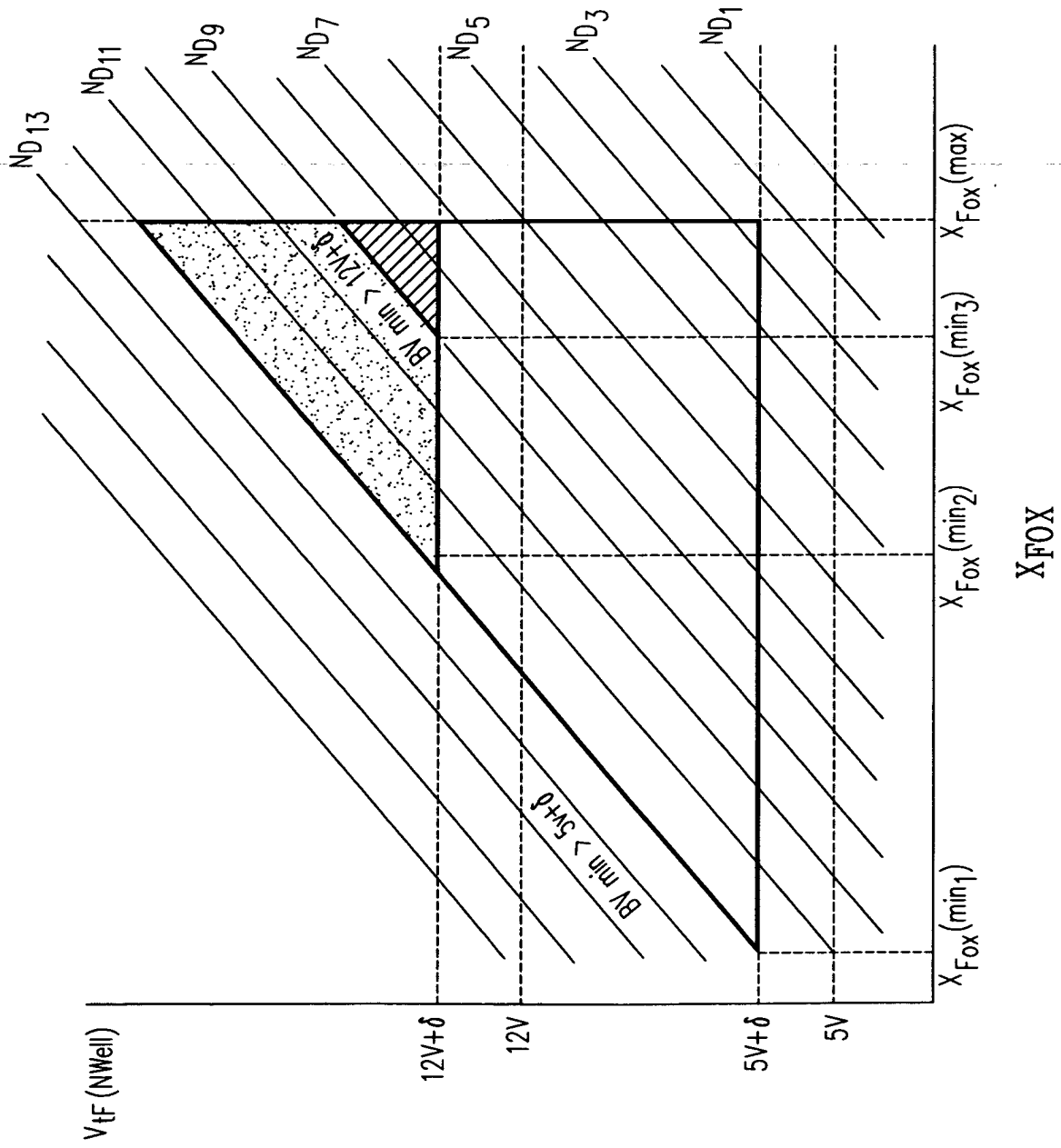


FIG. 10L

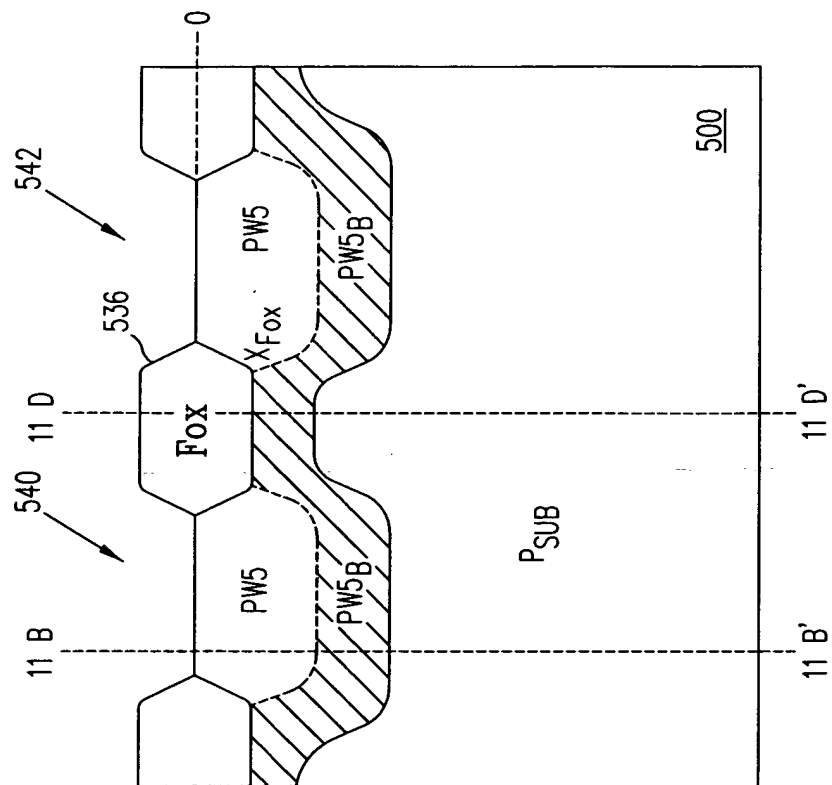


FIG. 11B

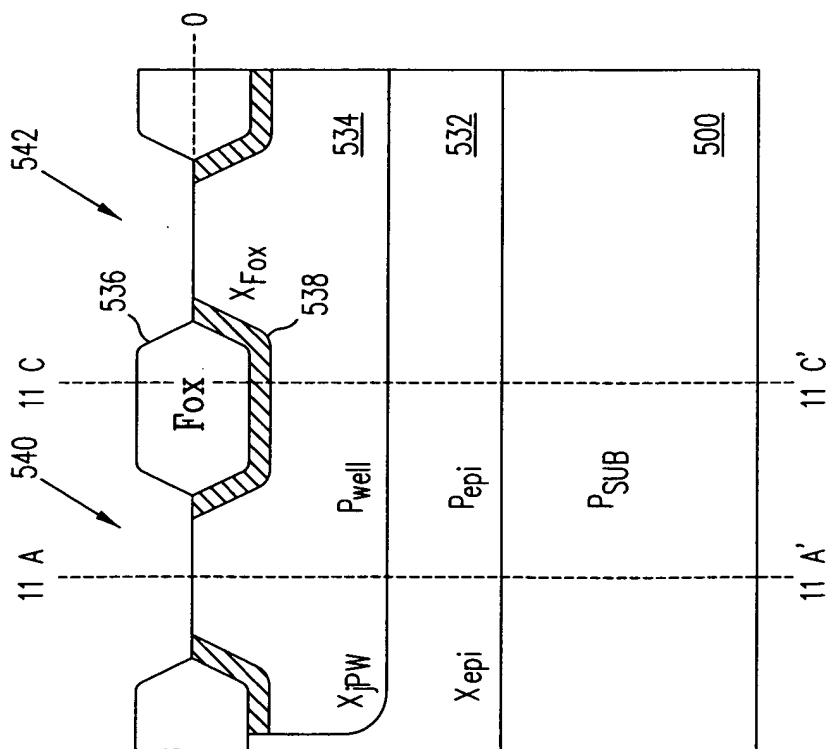


FIG. 11A

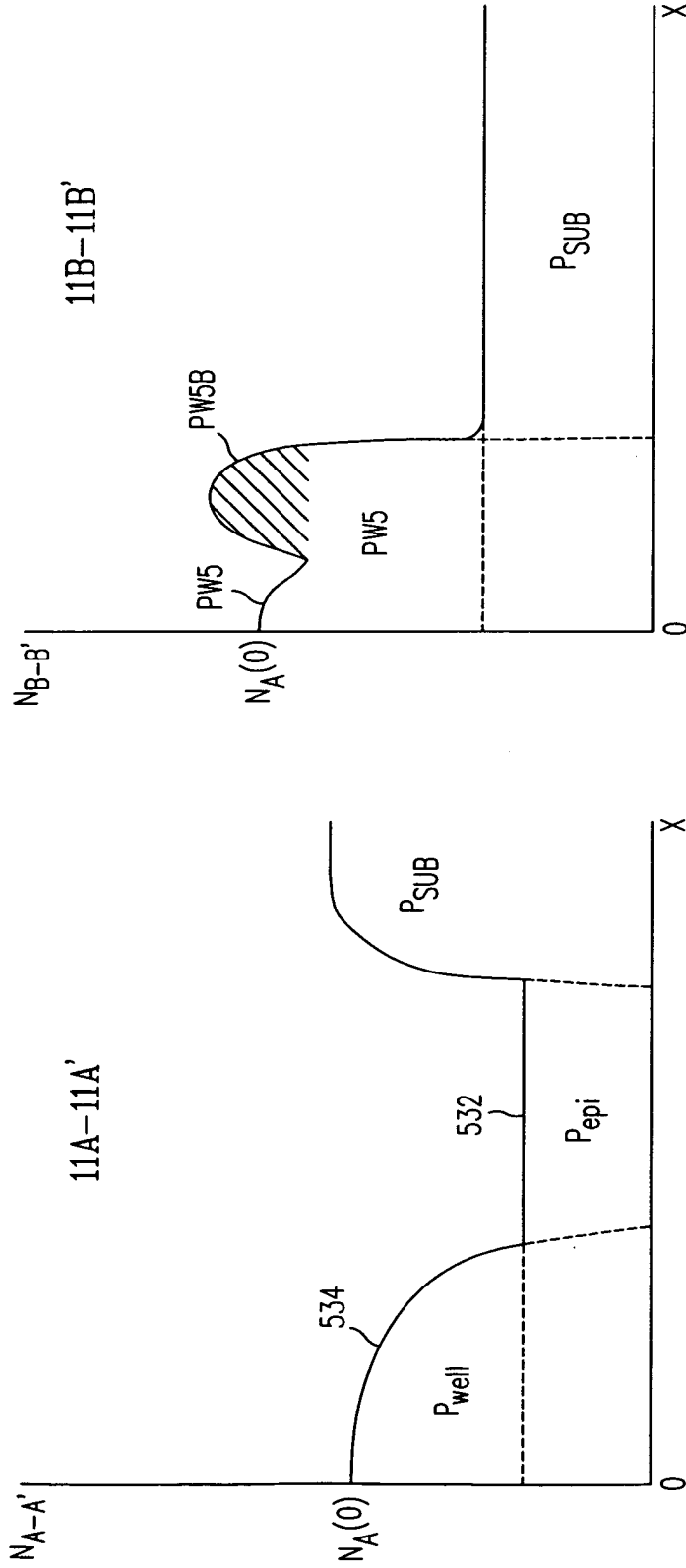


FIG. 11D

FIG. 11C

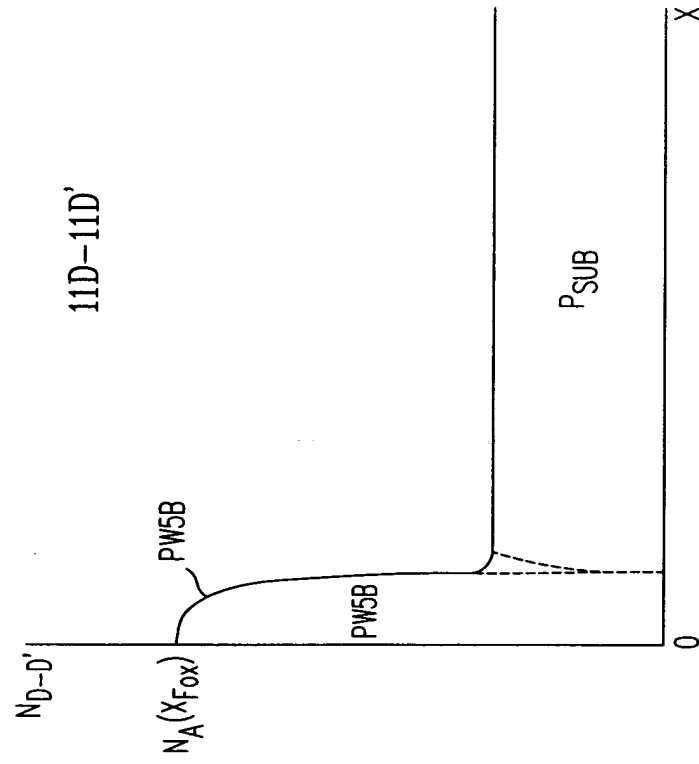


FIG. 11E

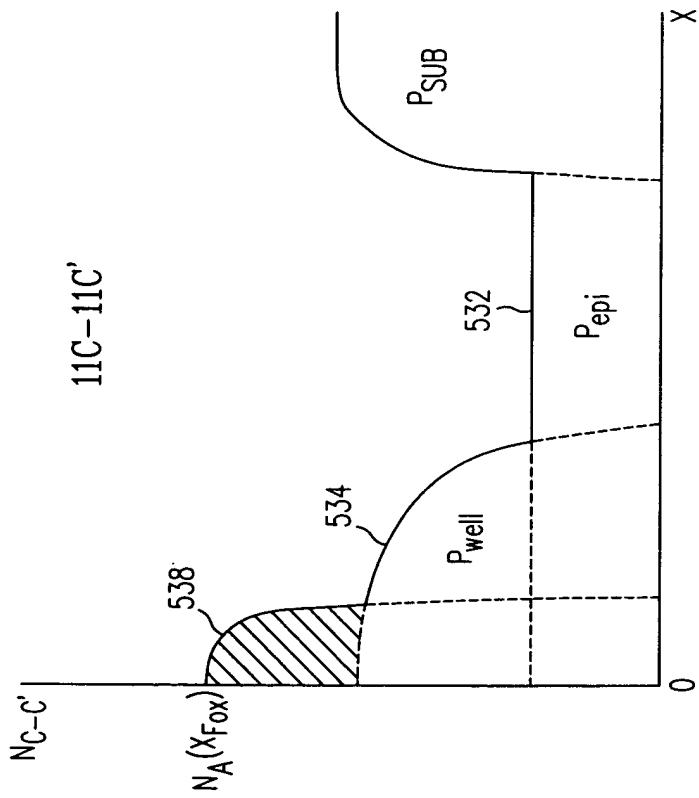


FIG. 11F

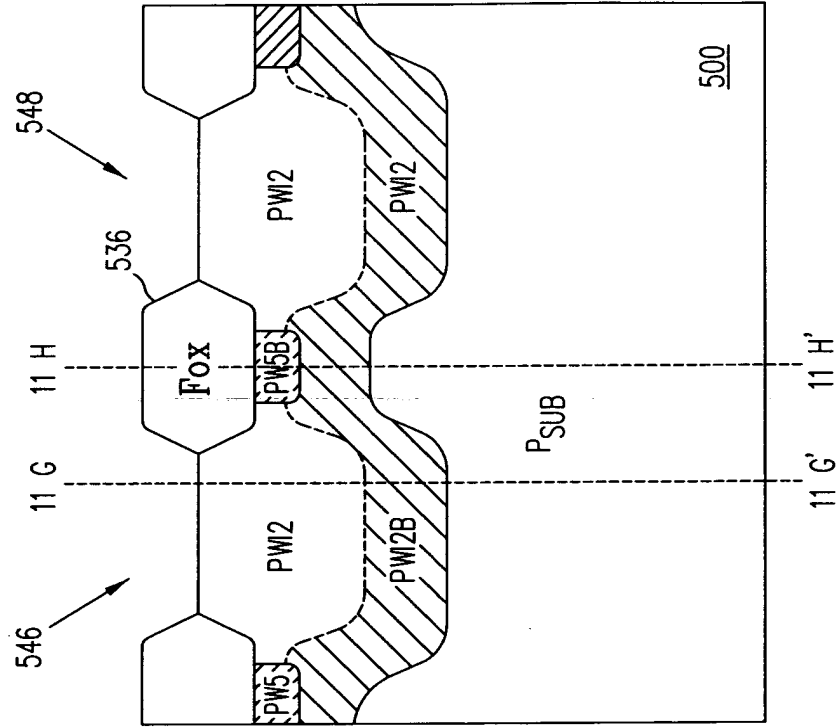


FIG. 11H

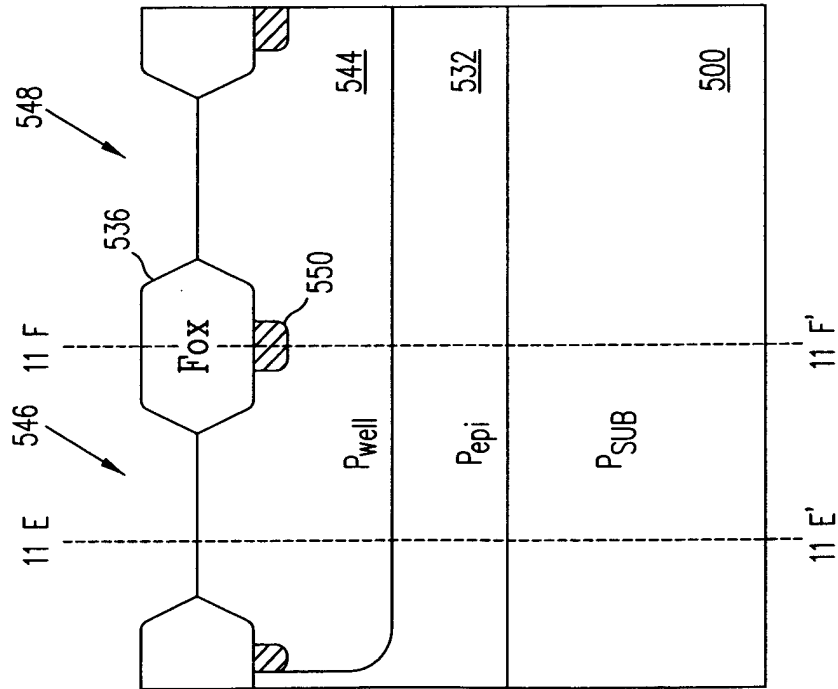


FIG. 11G

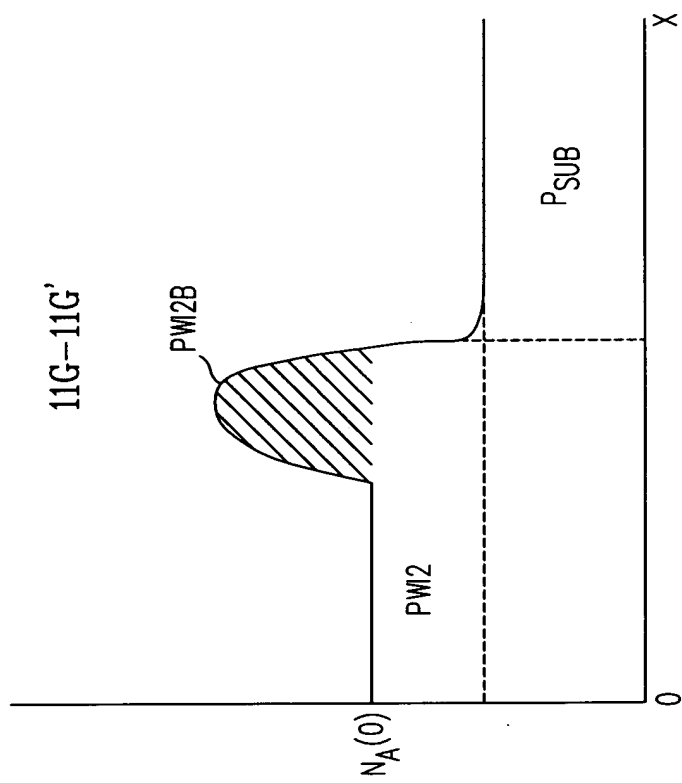


FIG. 11J

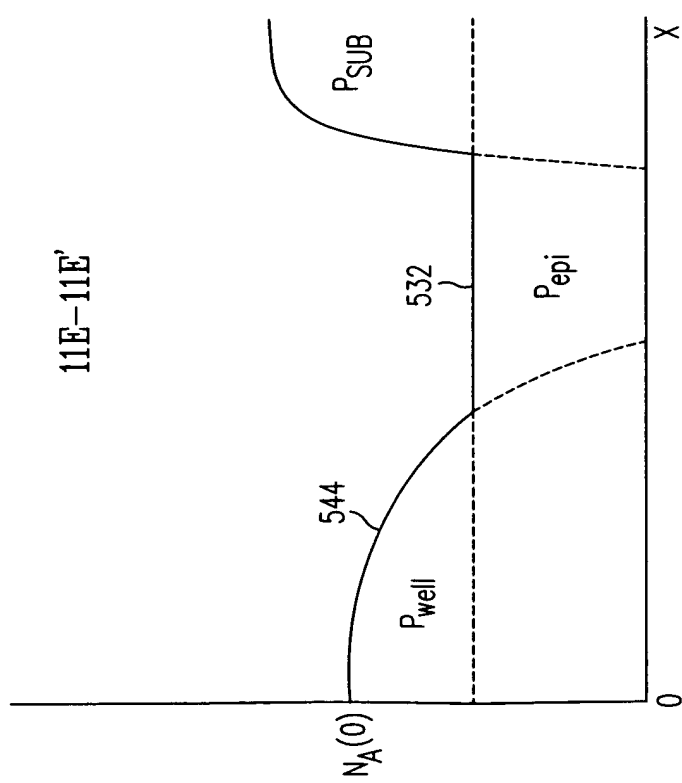


FIG. 11I

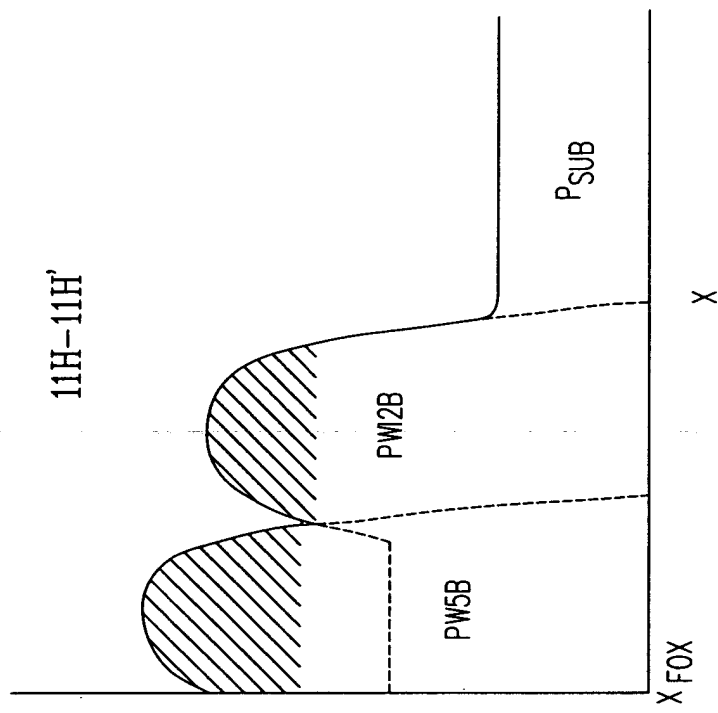


FIG. 11K

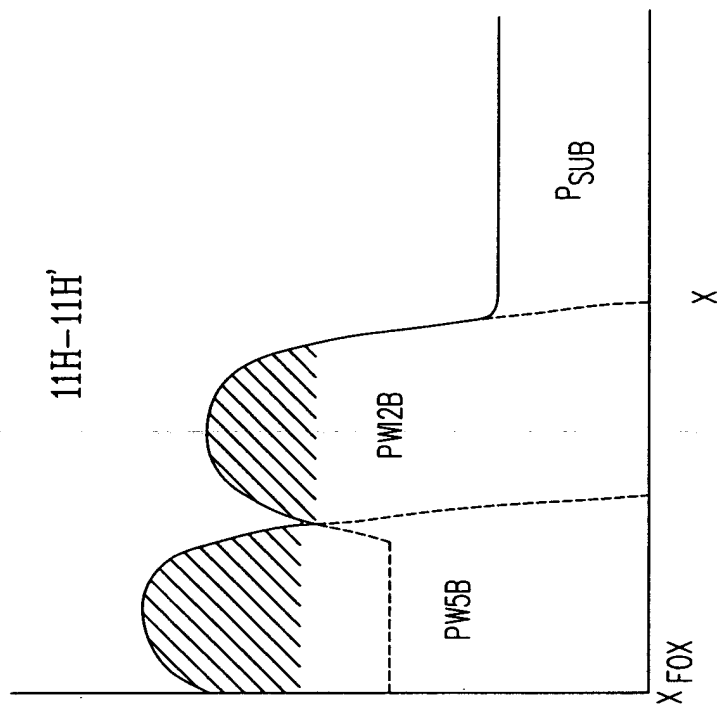


FIG. 11L

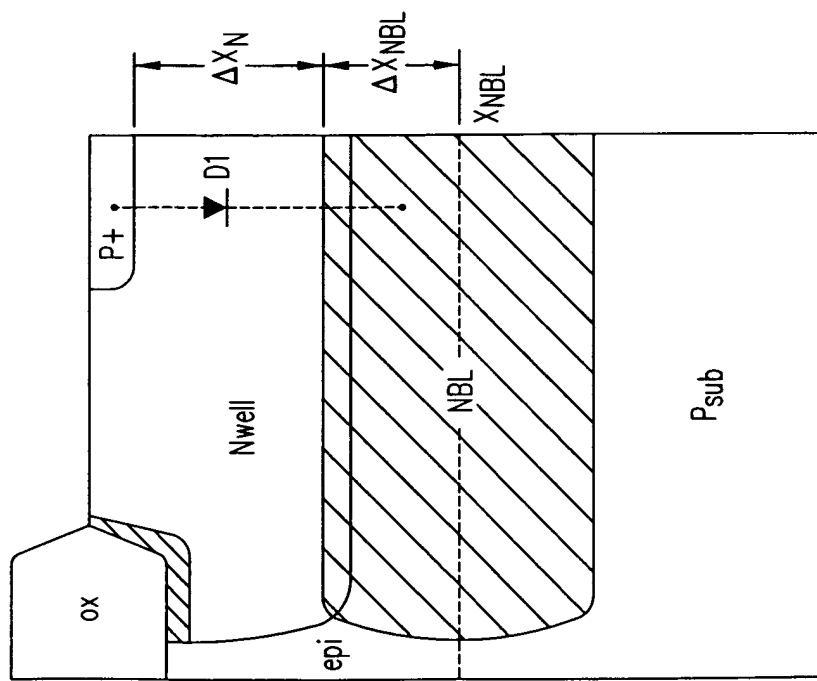


FIG. 12A

implanted

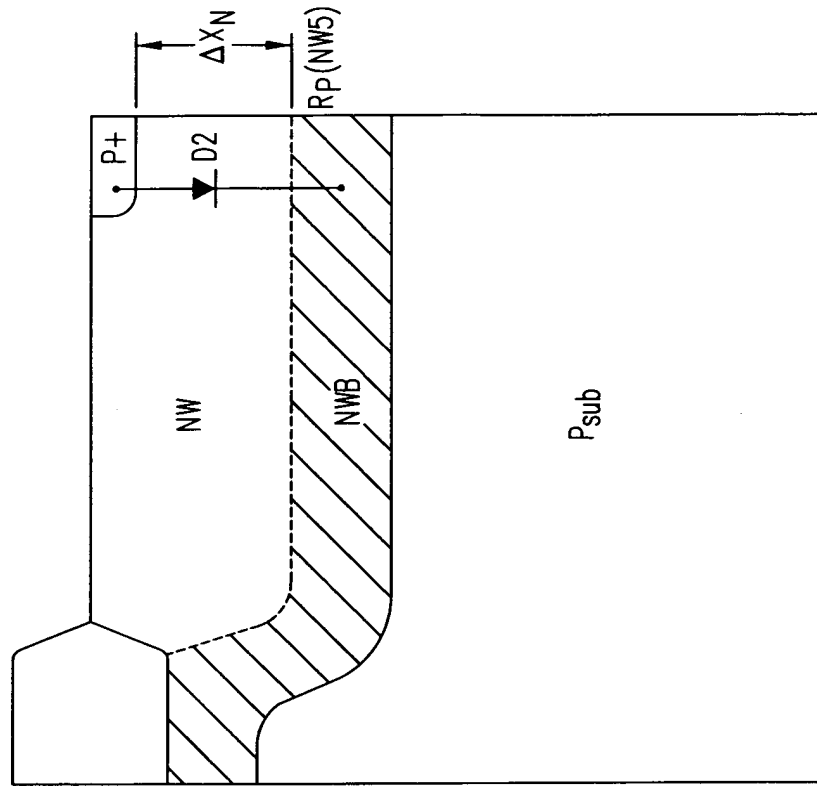


FIG. 12B

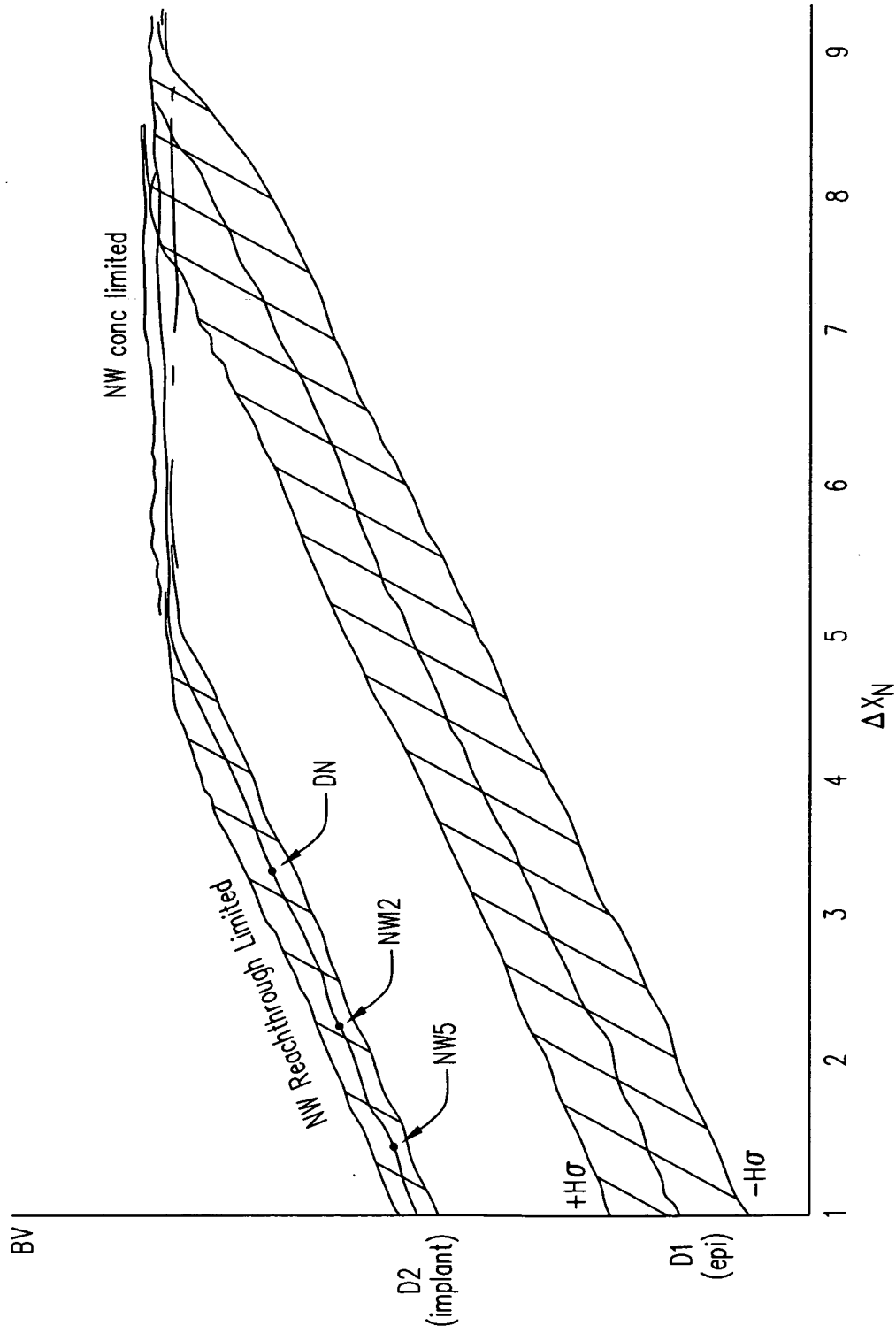


FIG. 12C

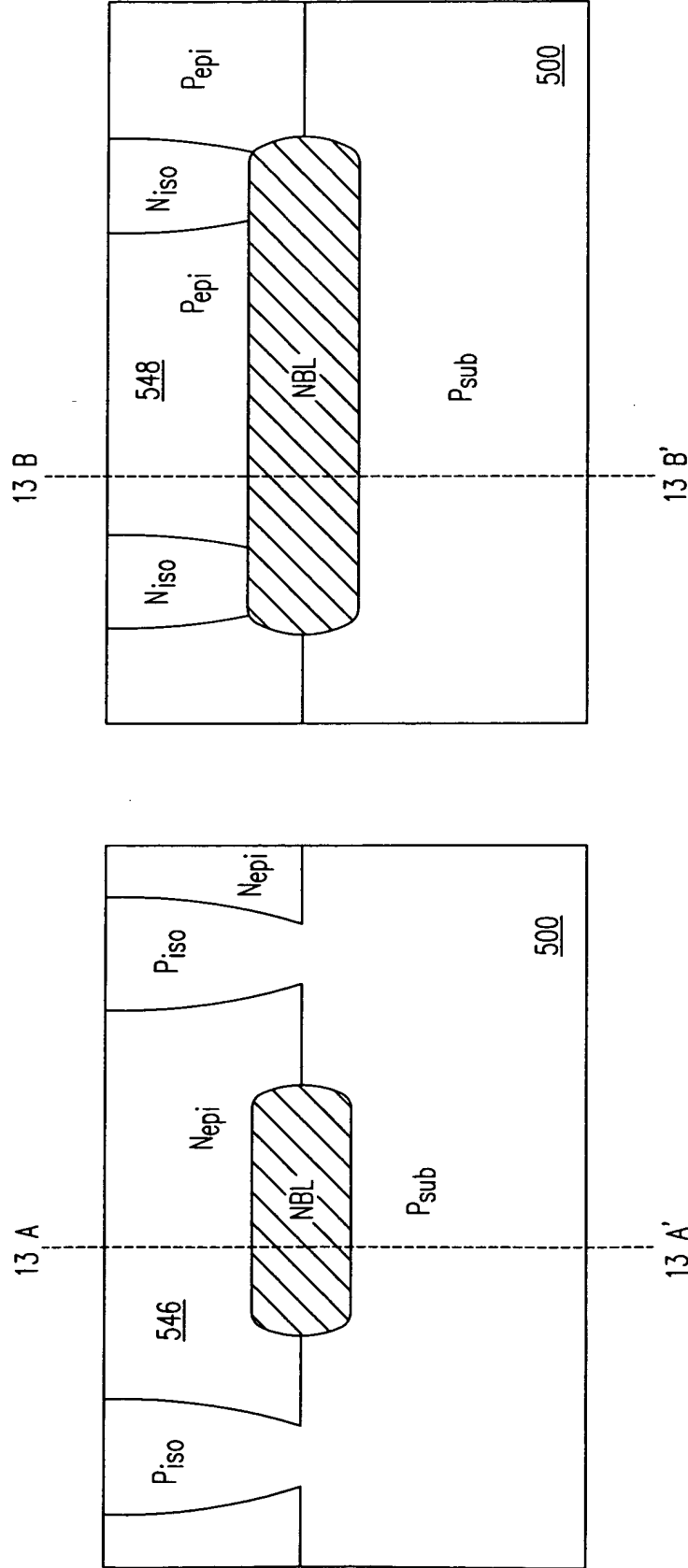


FIG. 13A
(Prior Art)

FIG. 13B
(Prior Art)

13B-13B'

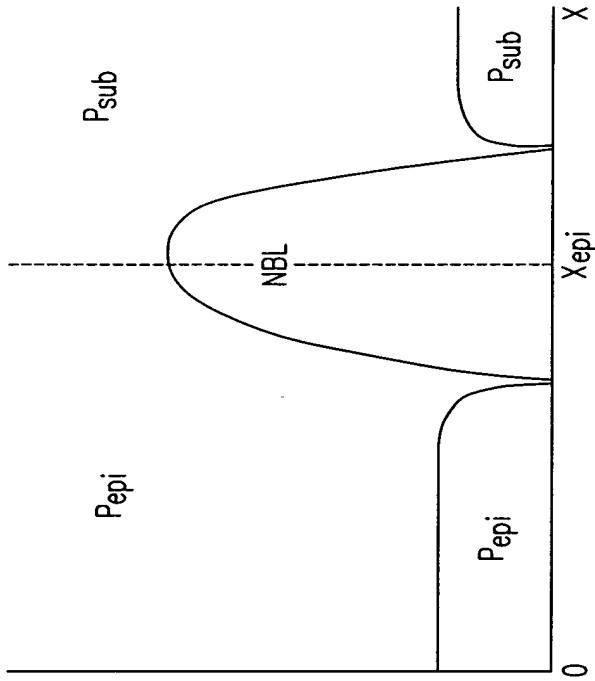


FIG. 13D

13A-13A'

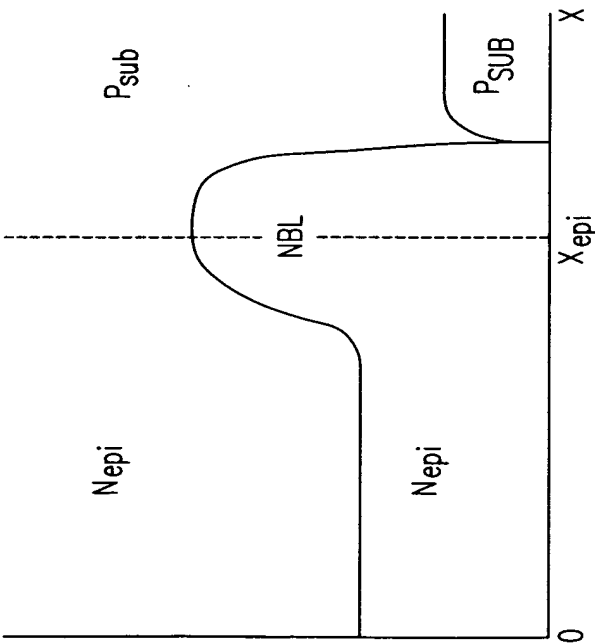


FIG. 13C

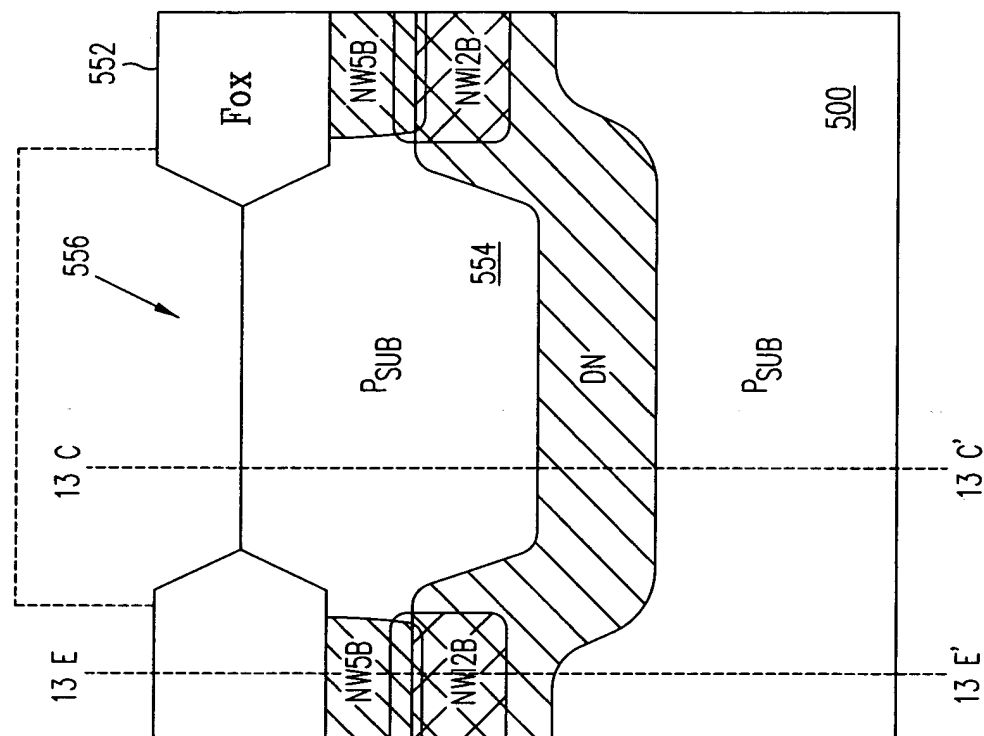


FIG. 13F

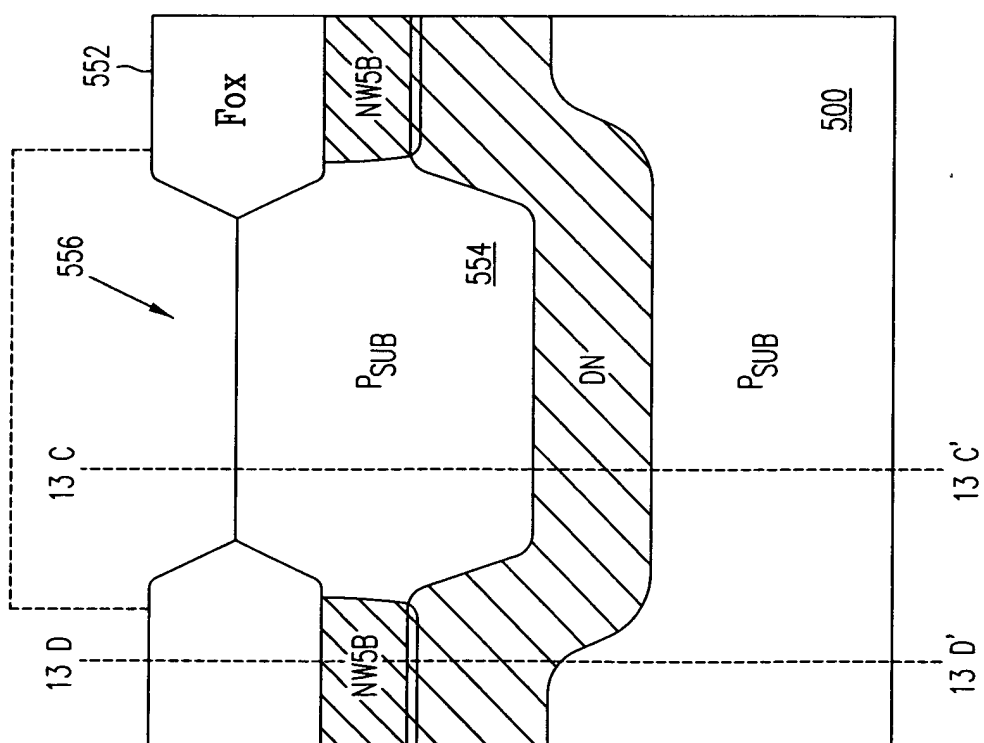


FIG. 13E

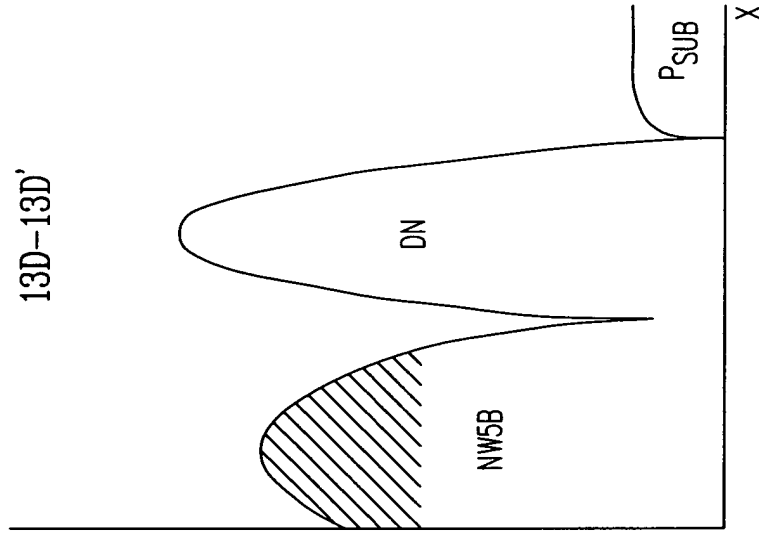


FIG. 13G

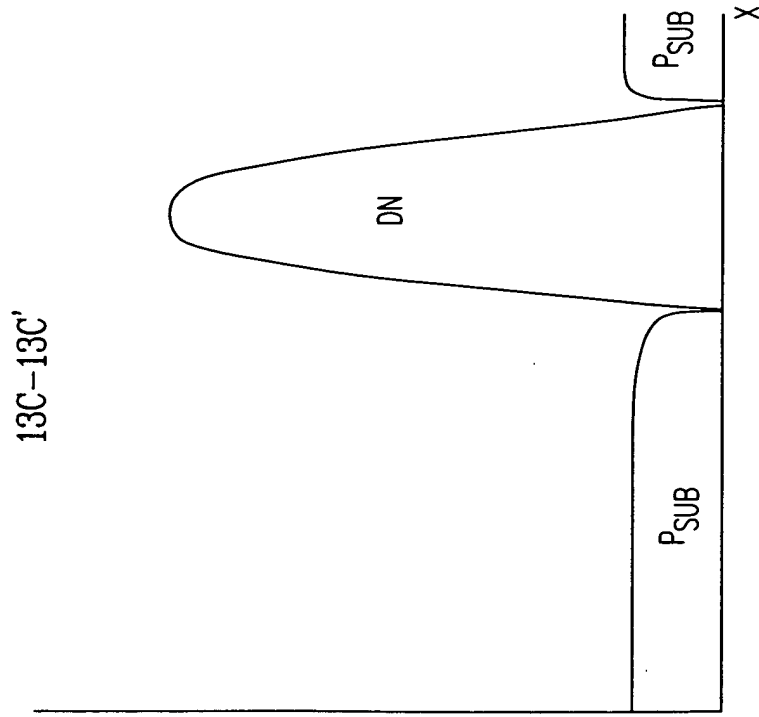
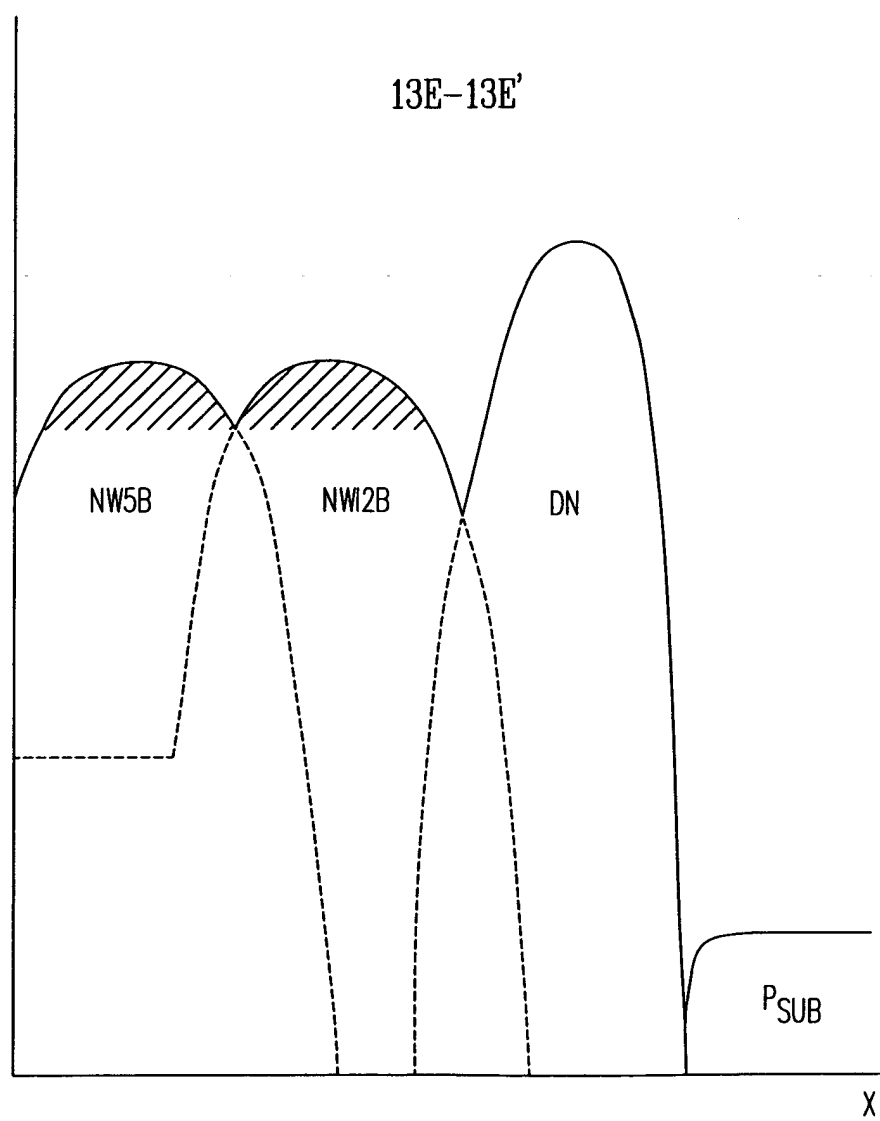


FIG. 13H

*FIG. 13I*

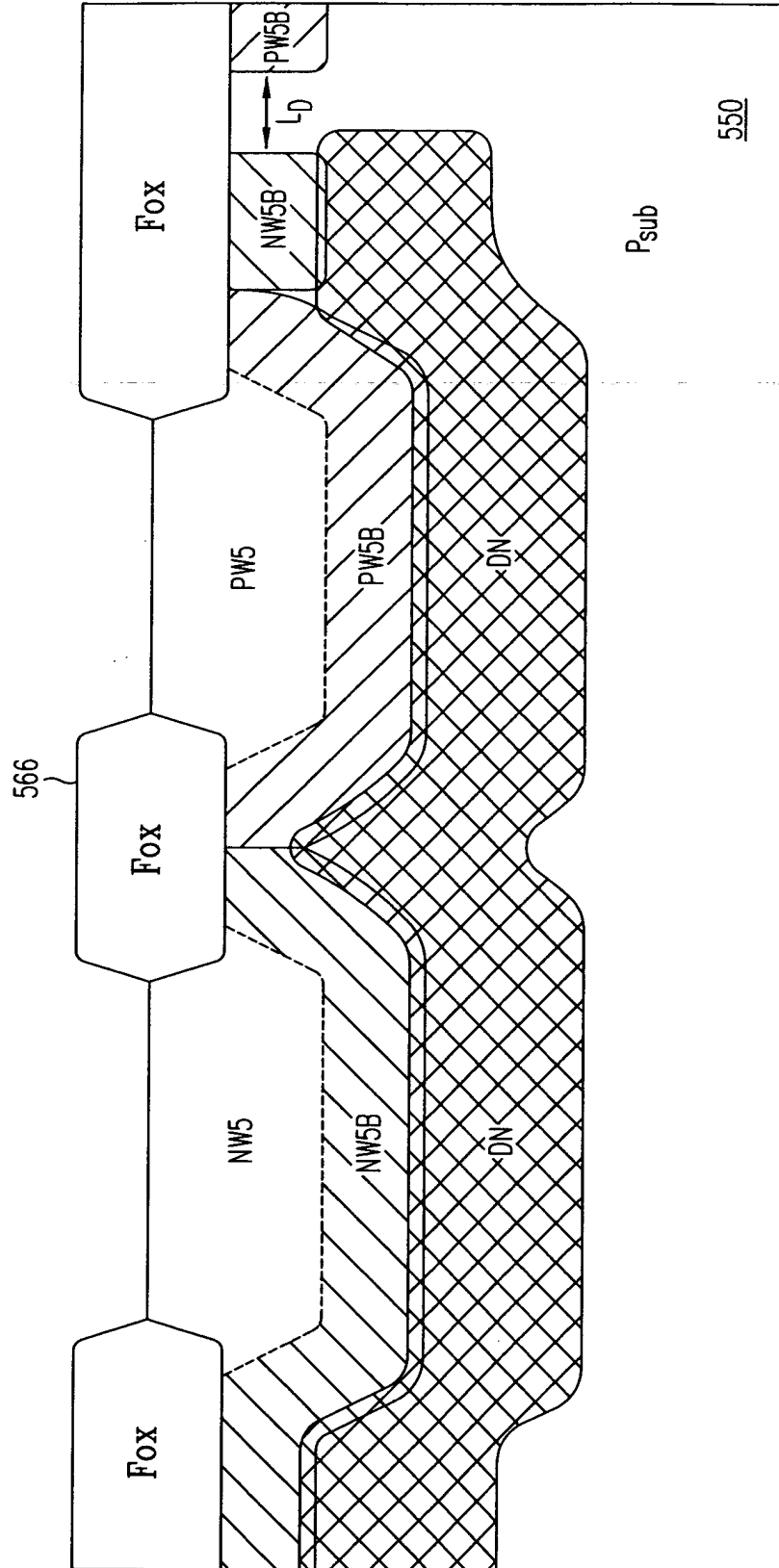


FIG. 14A

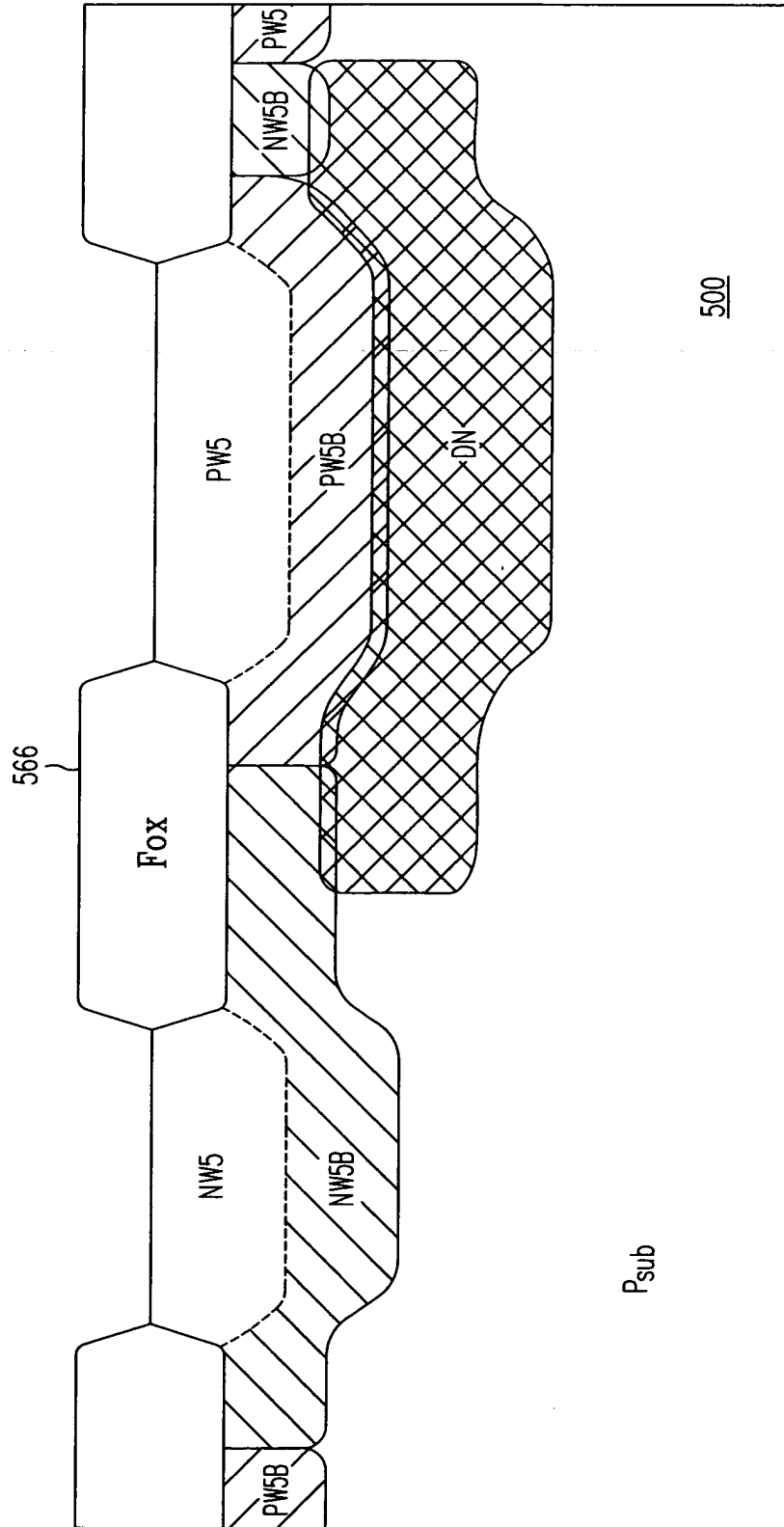


FIG. 14B

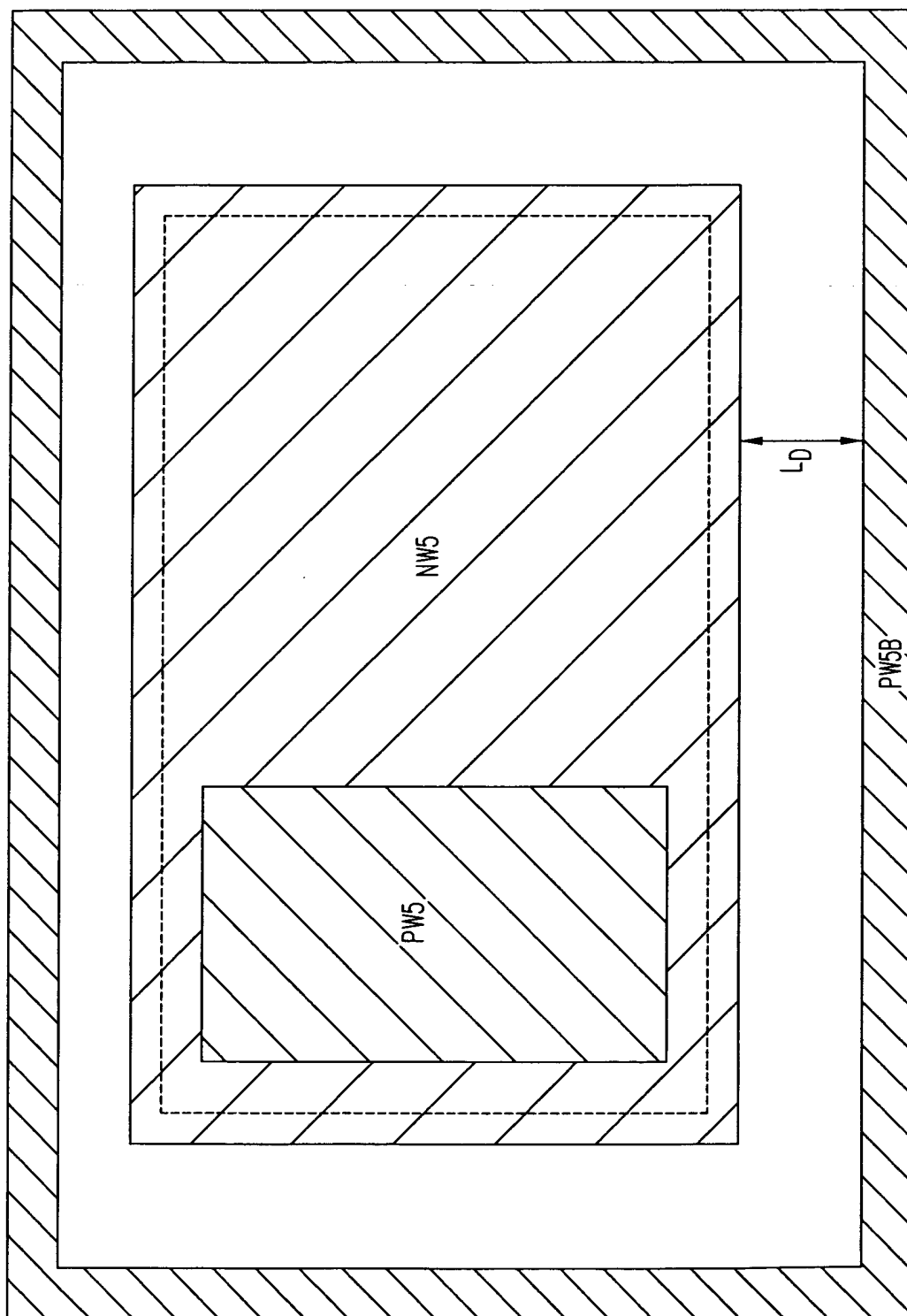


FIG. 14C

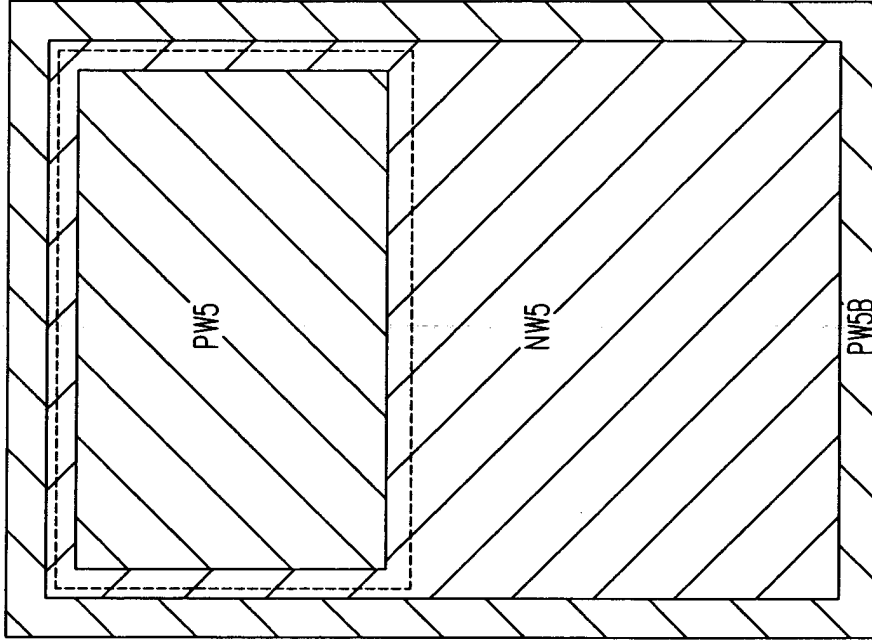


FIG. 14E

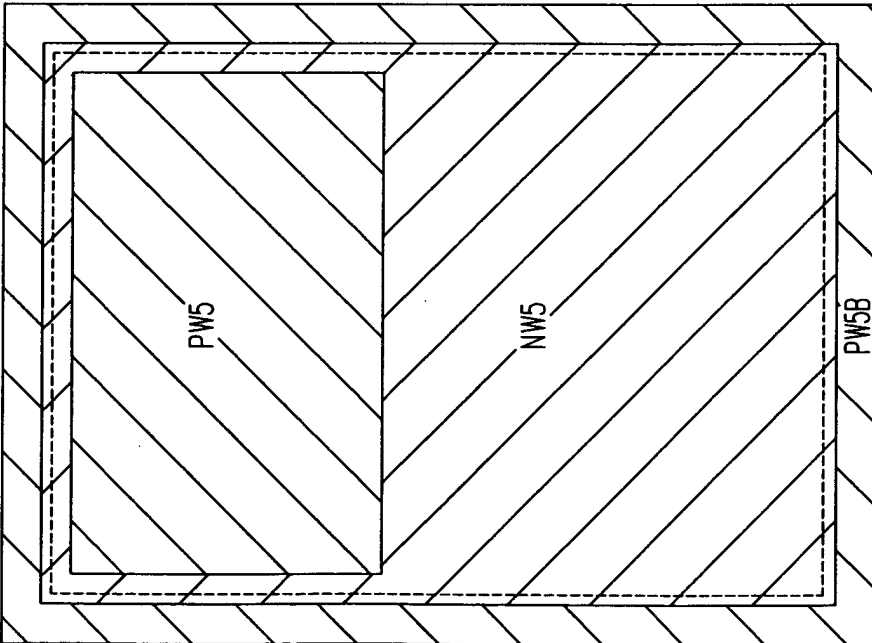


FIG. 14D

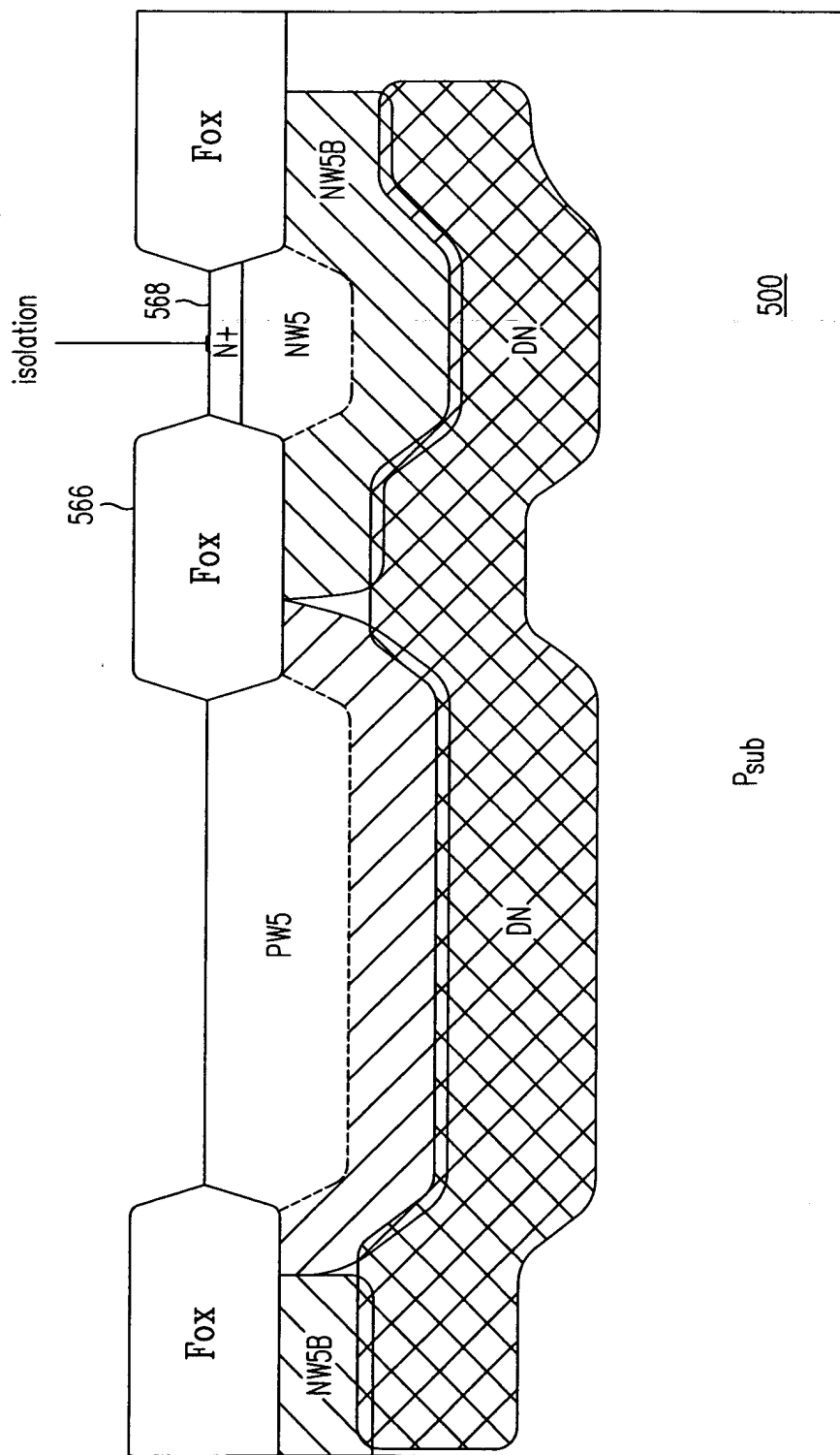


FIG. 14F

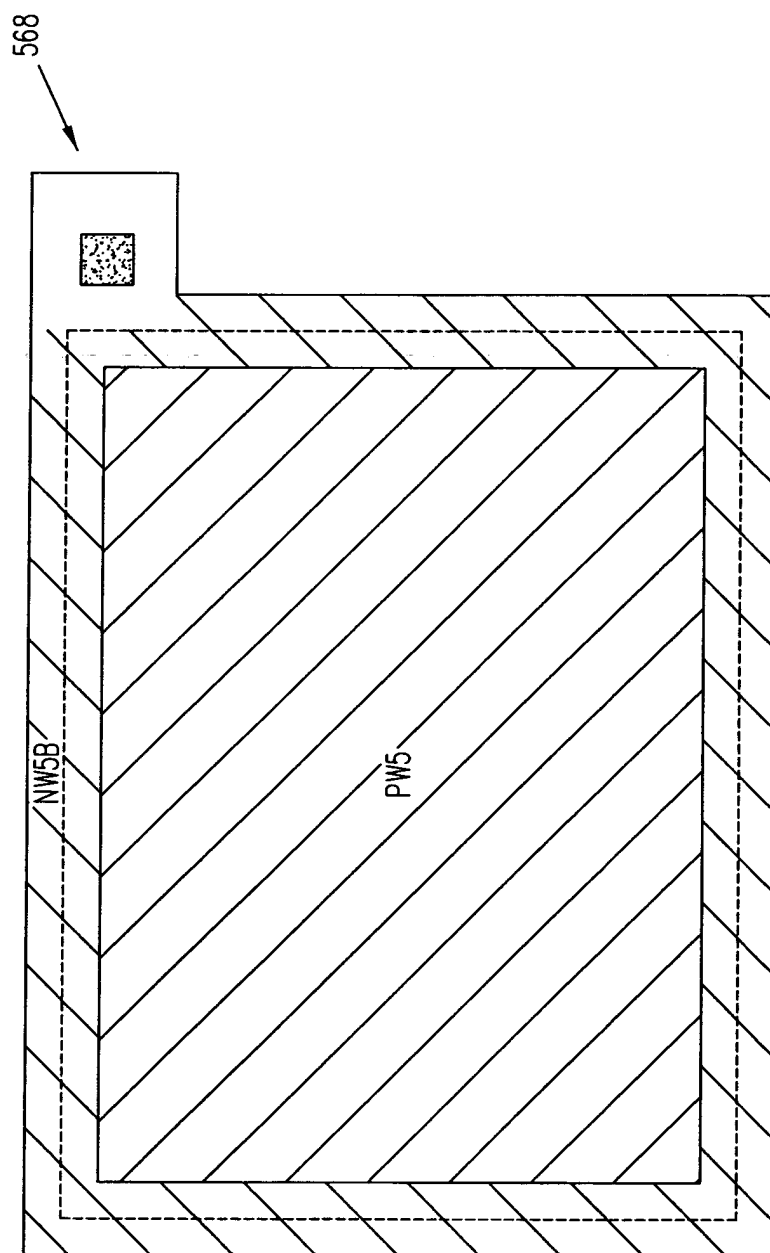


FIG. 14G

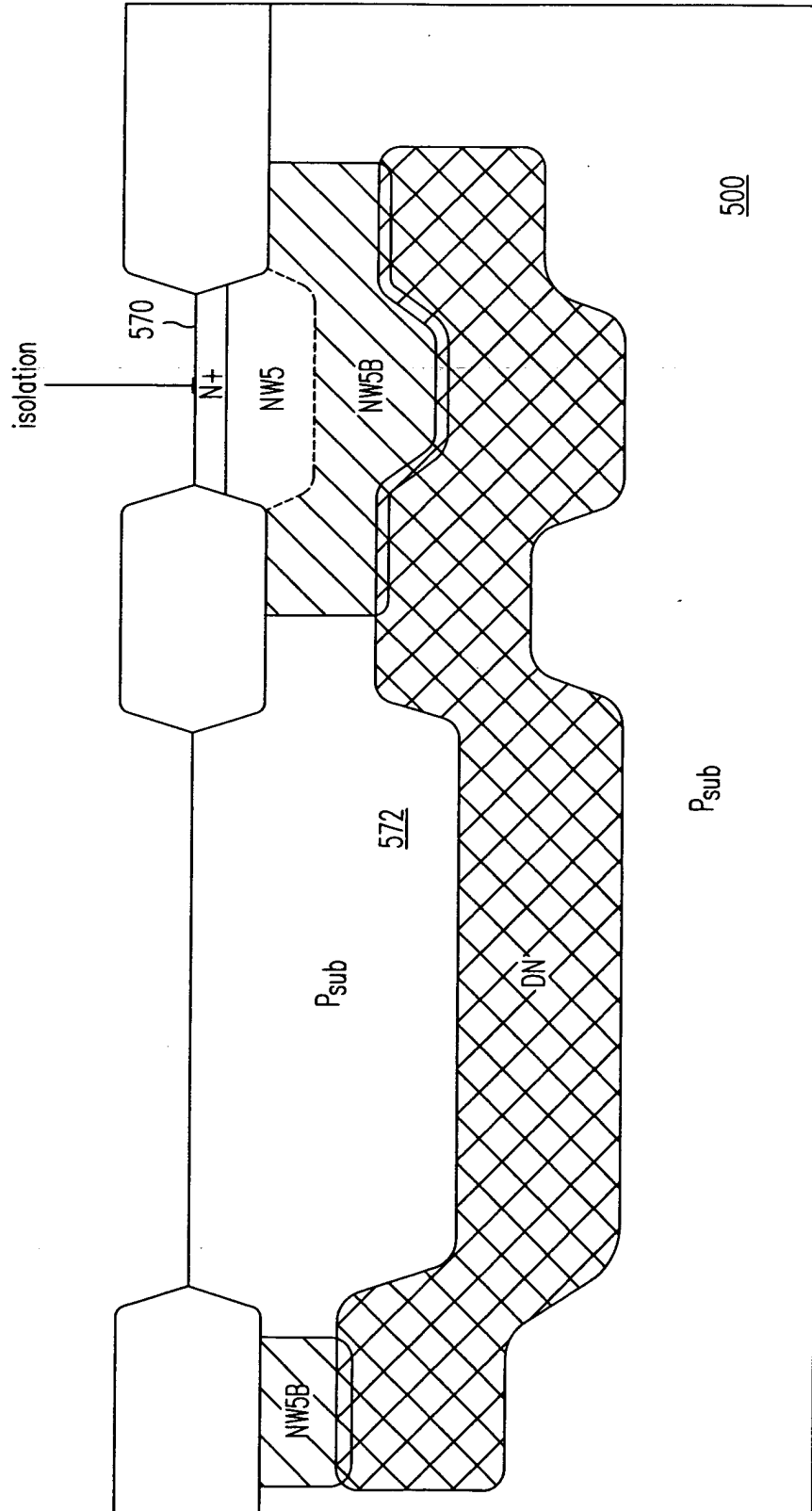


FIG. 14H

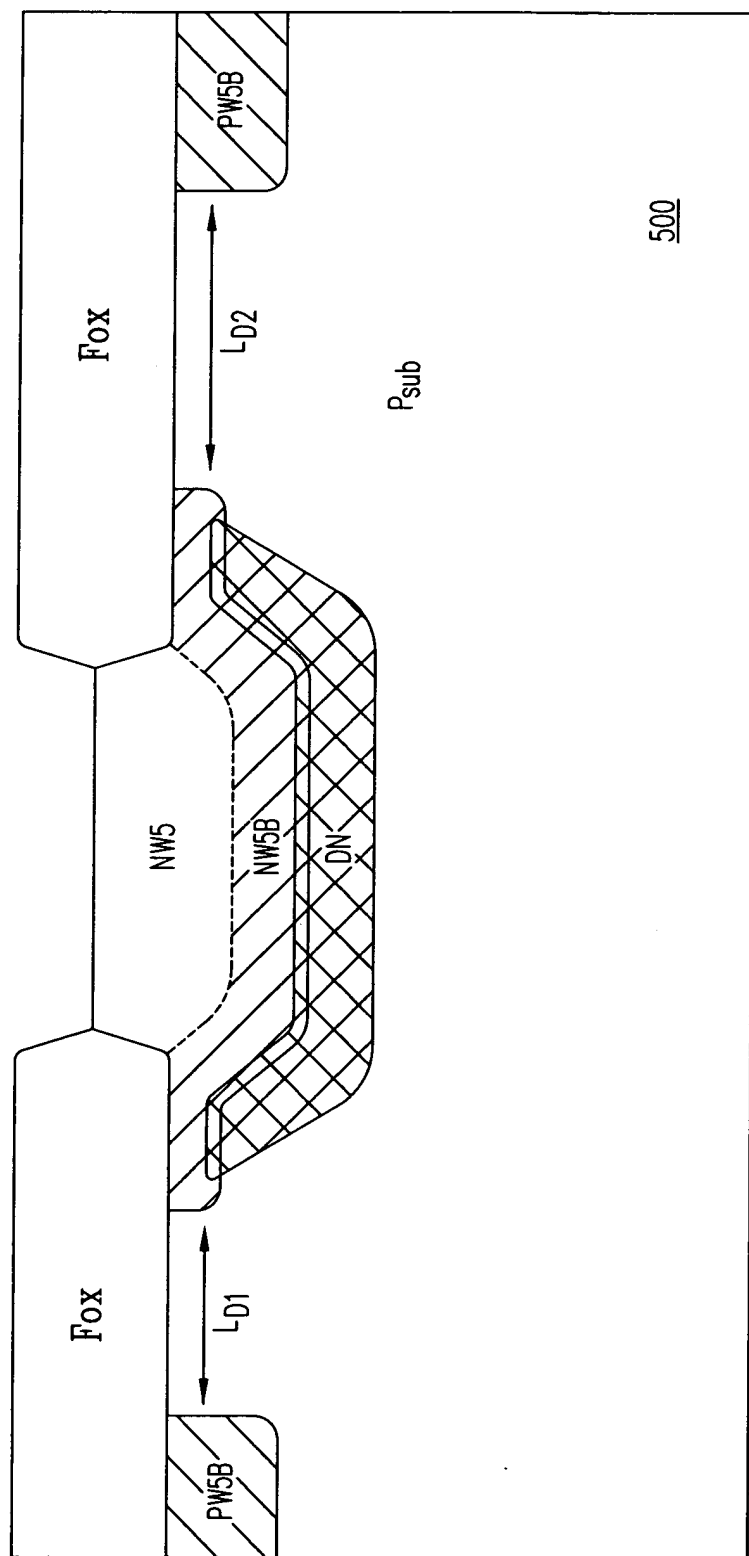


FIG. 14I

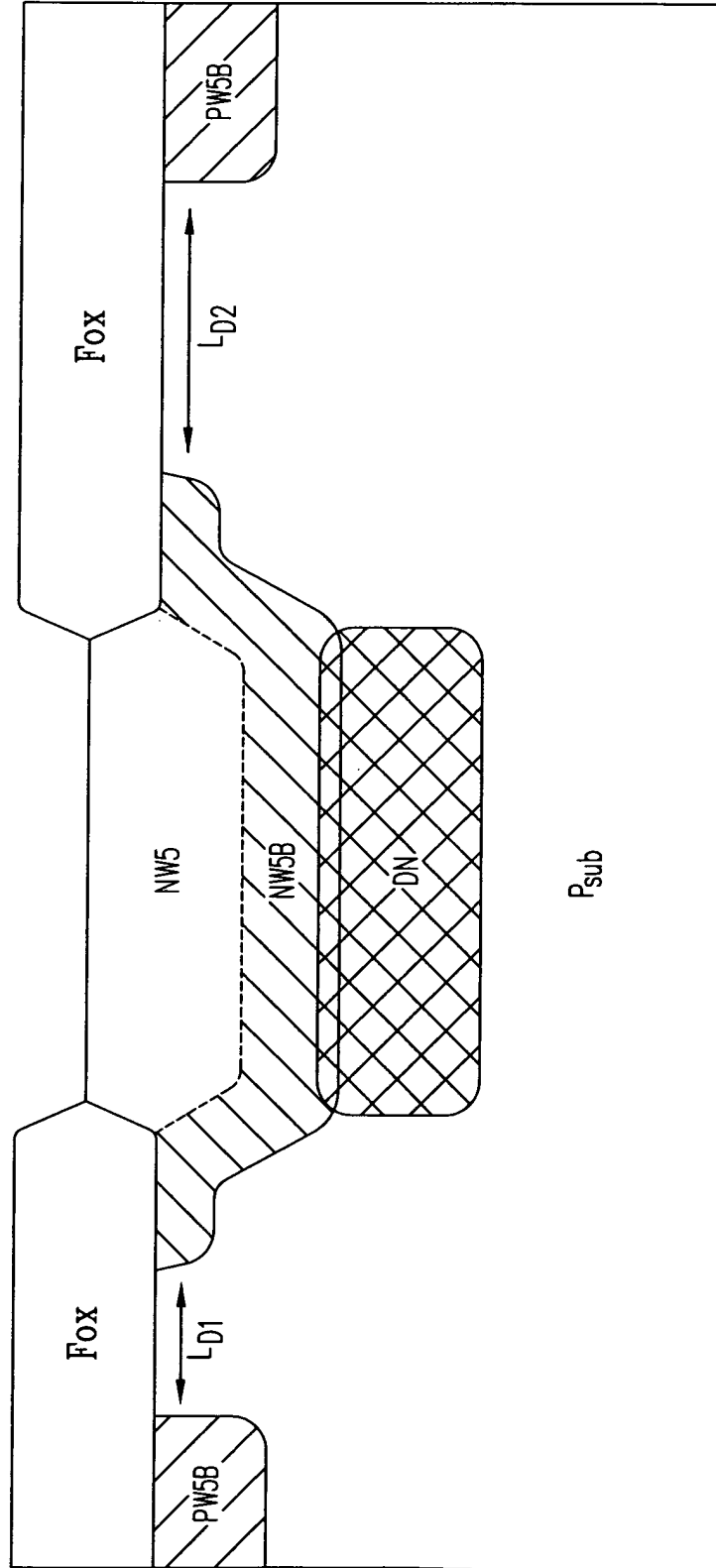


FIG. 14J

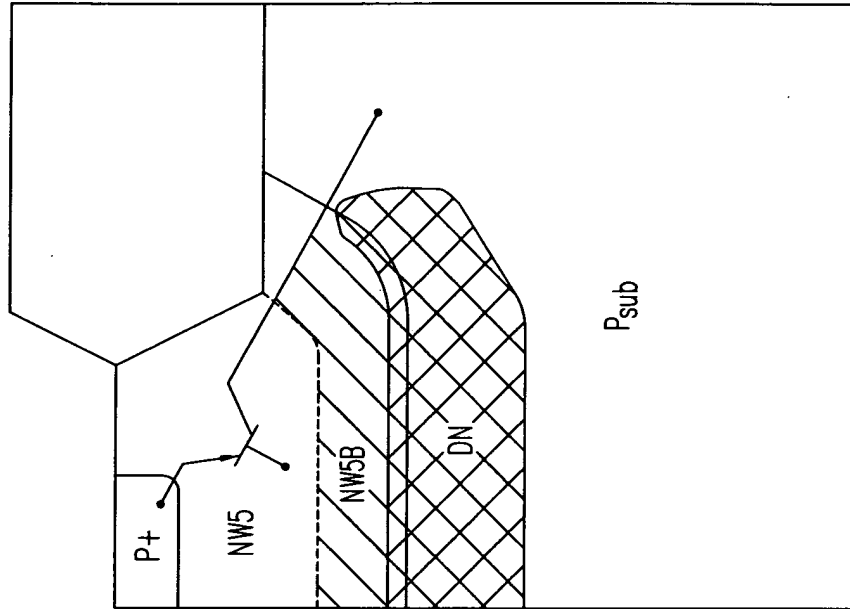


FIG. 14L

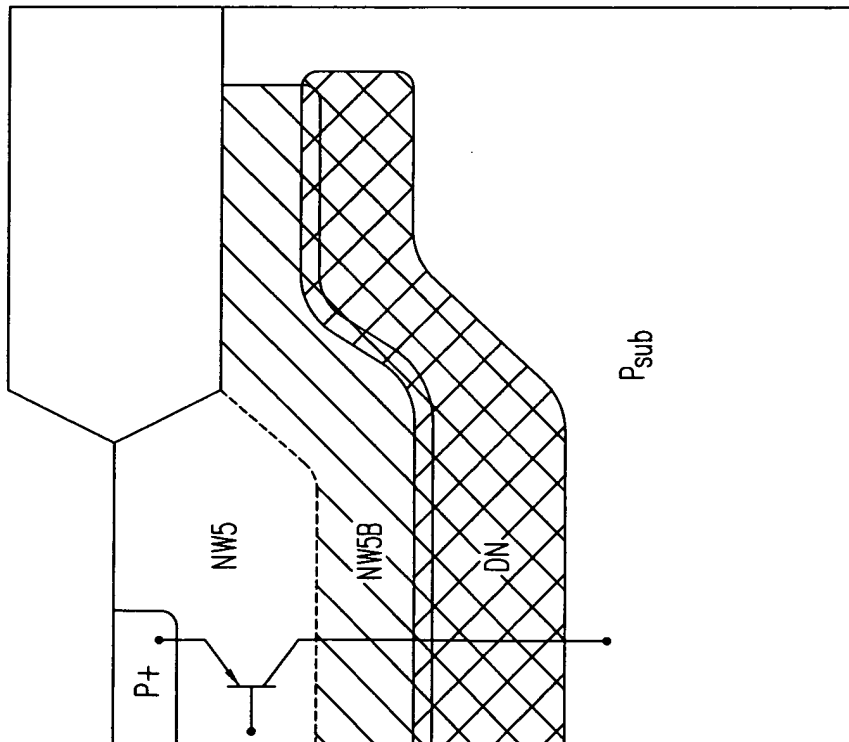


FIG. 14K

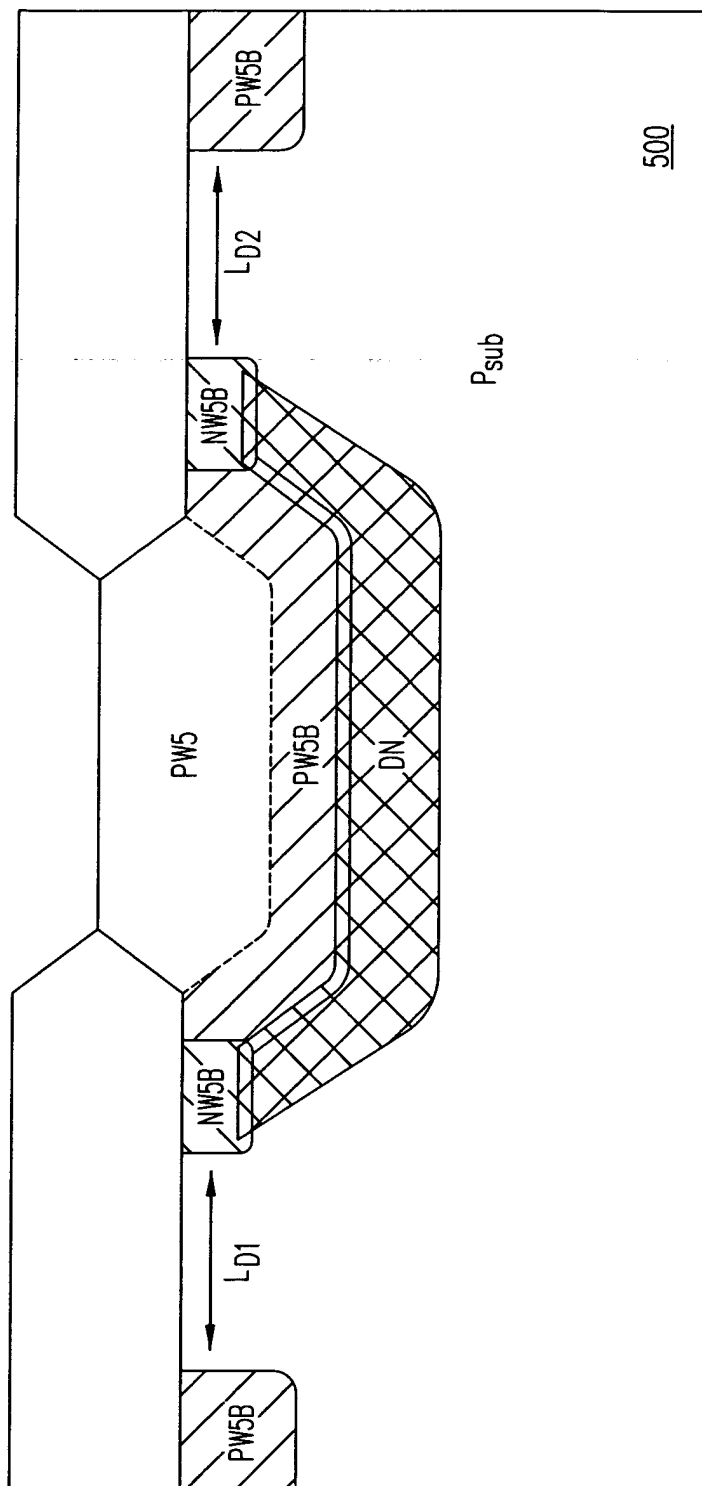


FIG. 14M

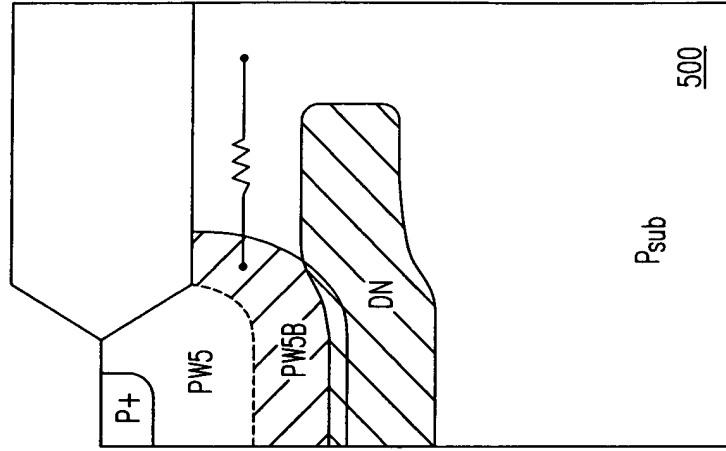


FIG. 14P

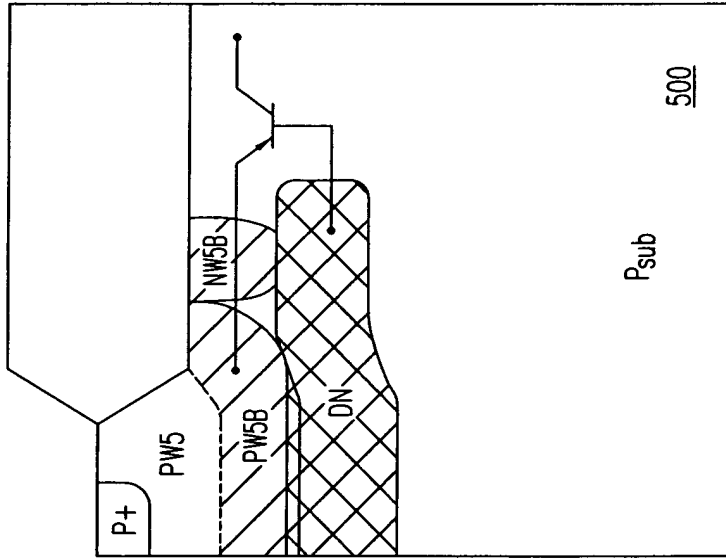


FIG. 14Q

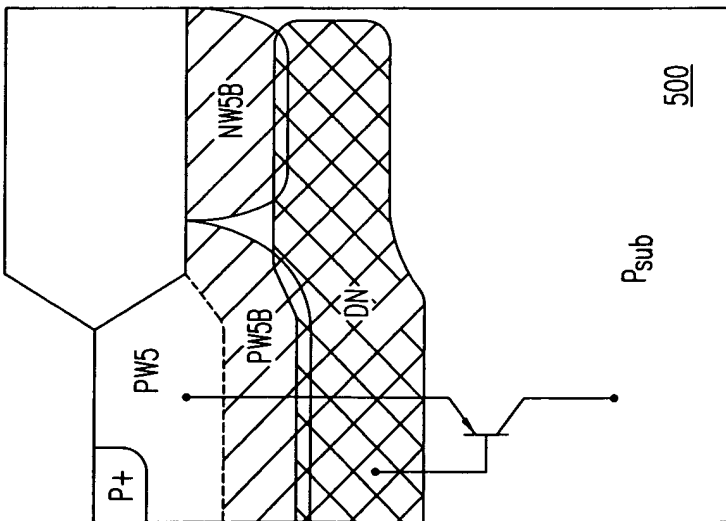


FIG. 14N

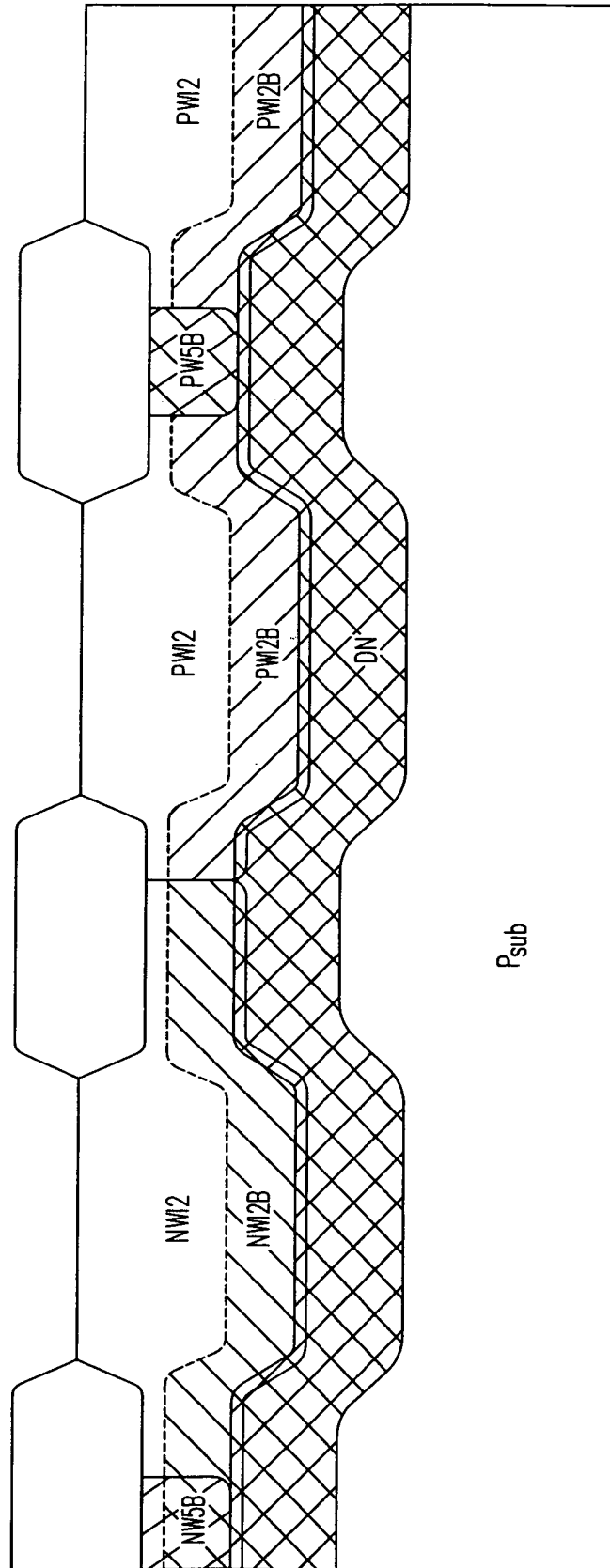


FIG. 15A

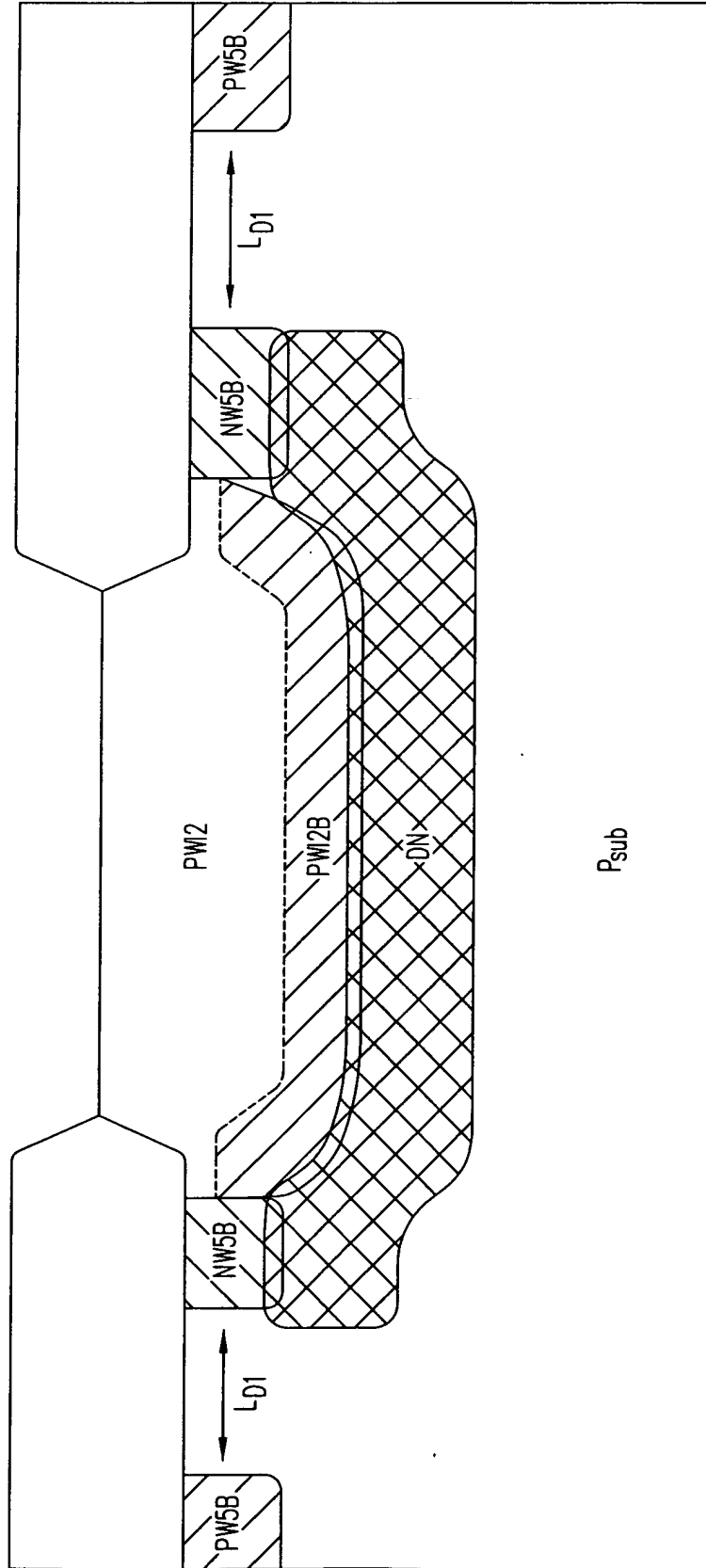


FIG. 15B

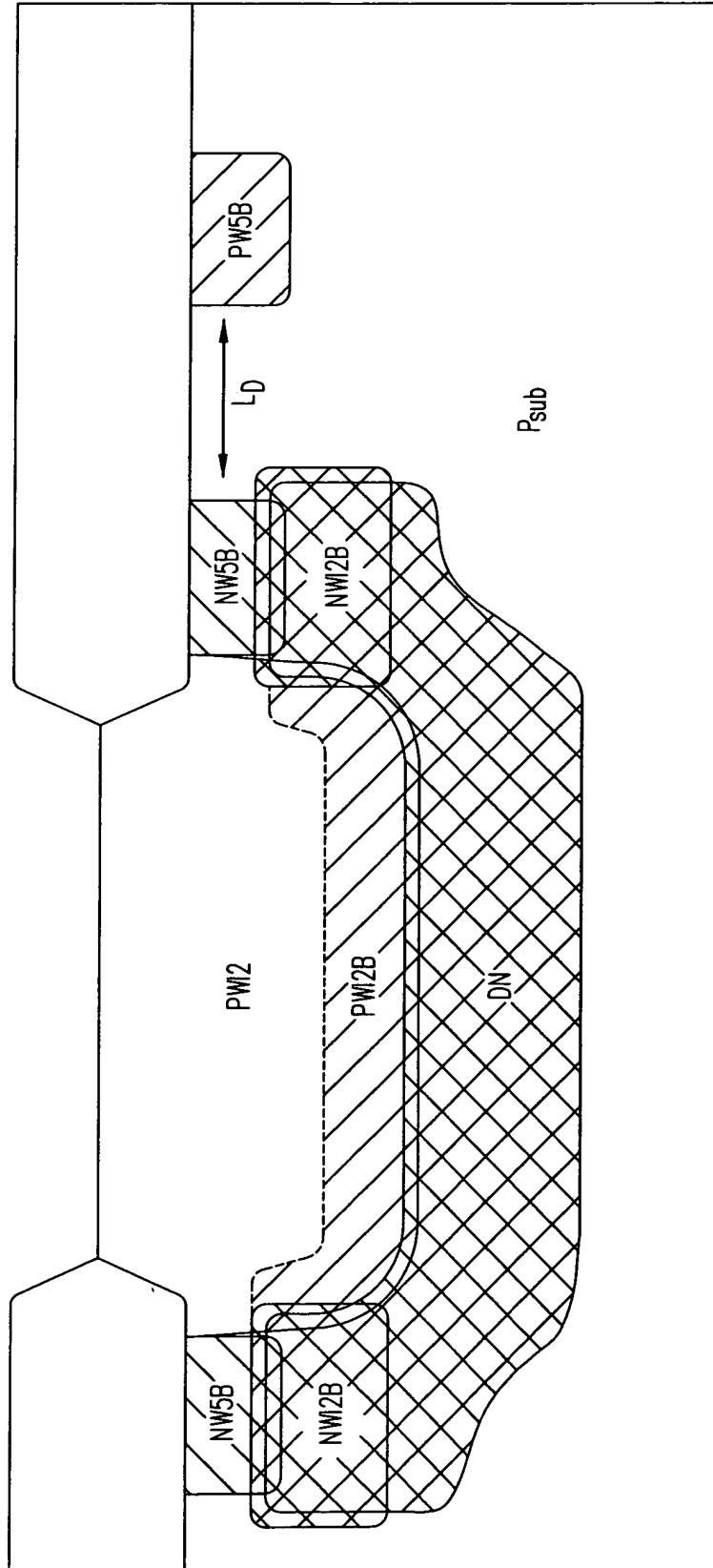


FIG. 15C

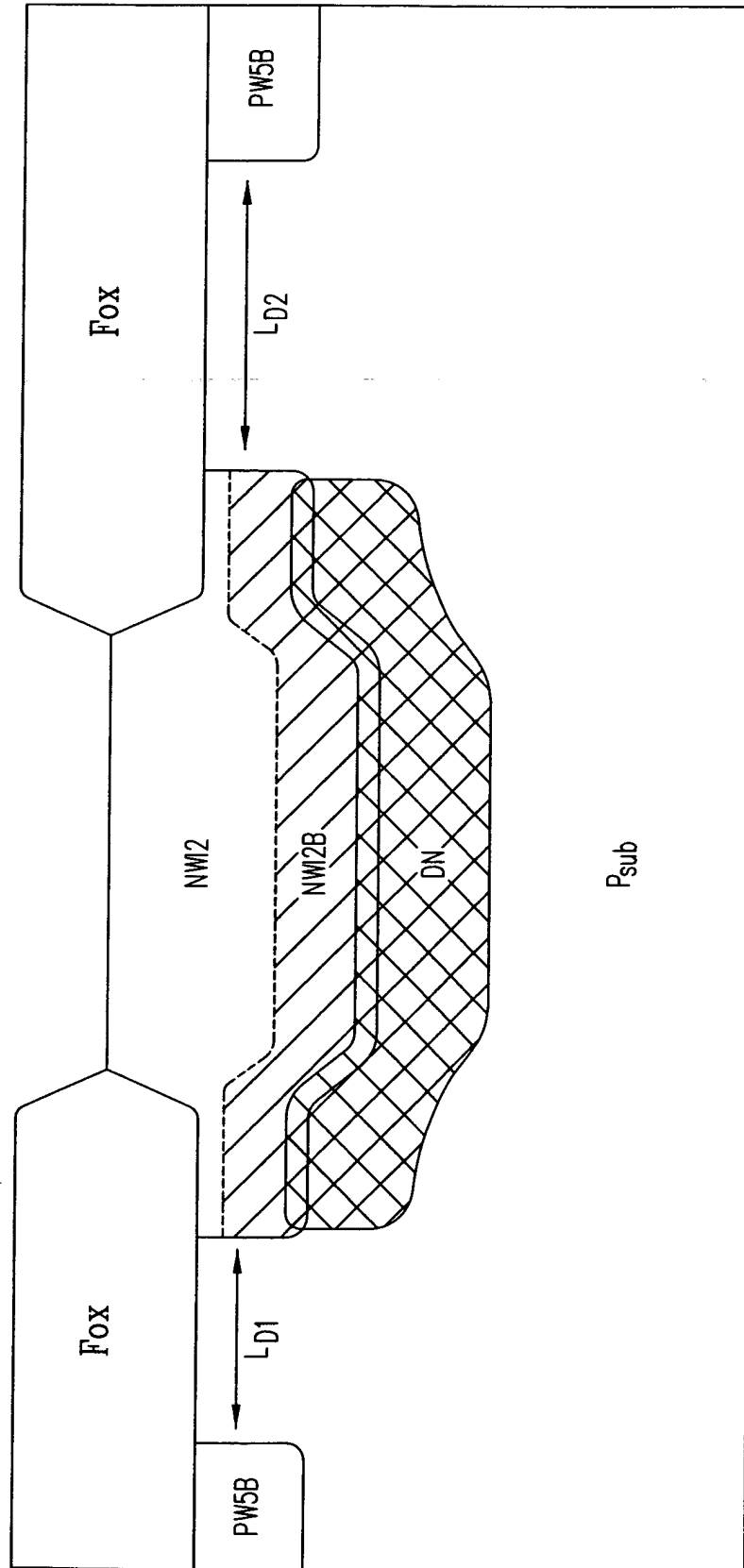


FIG. 15D

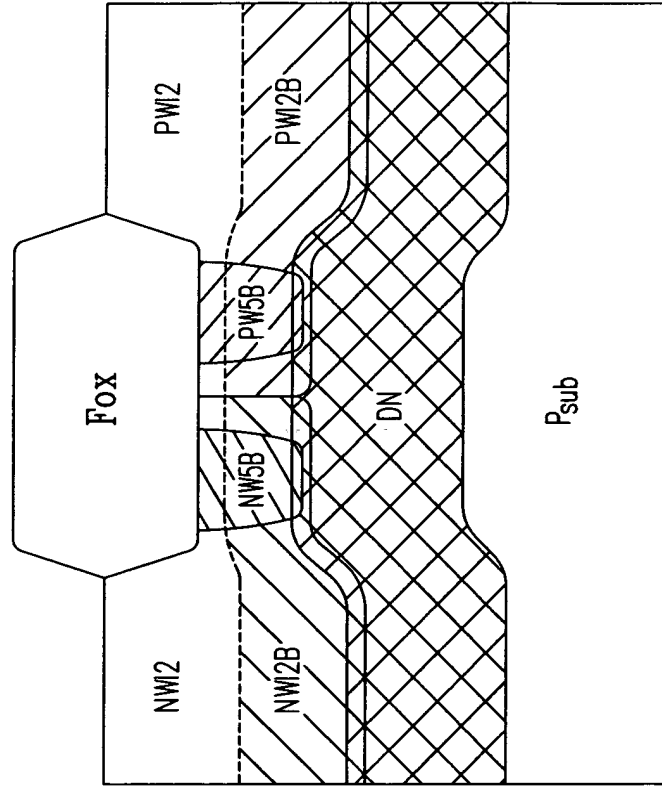


FIG. 15F

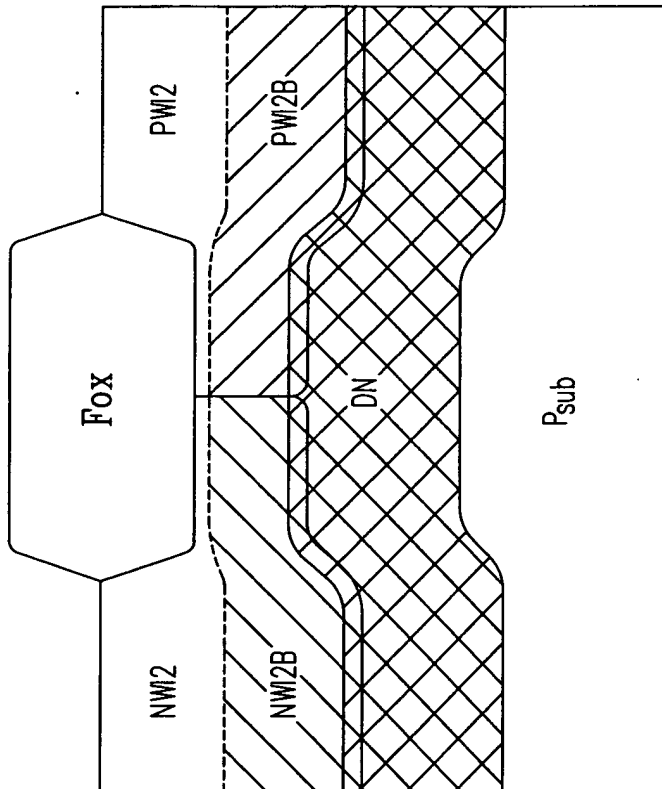


FIG. 15E

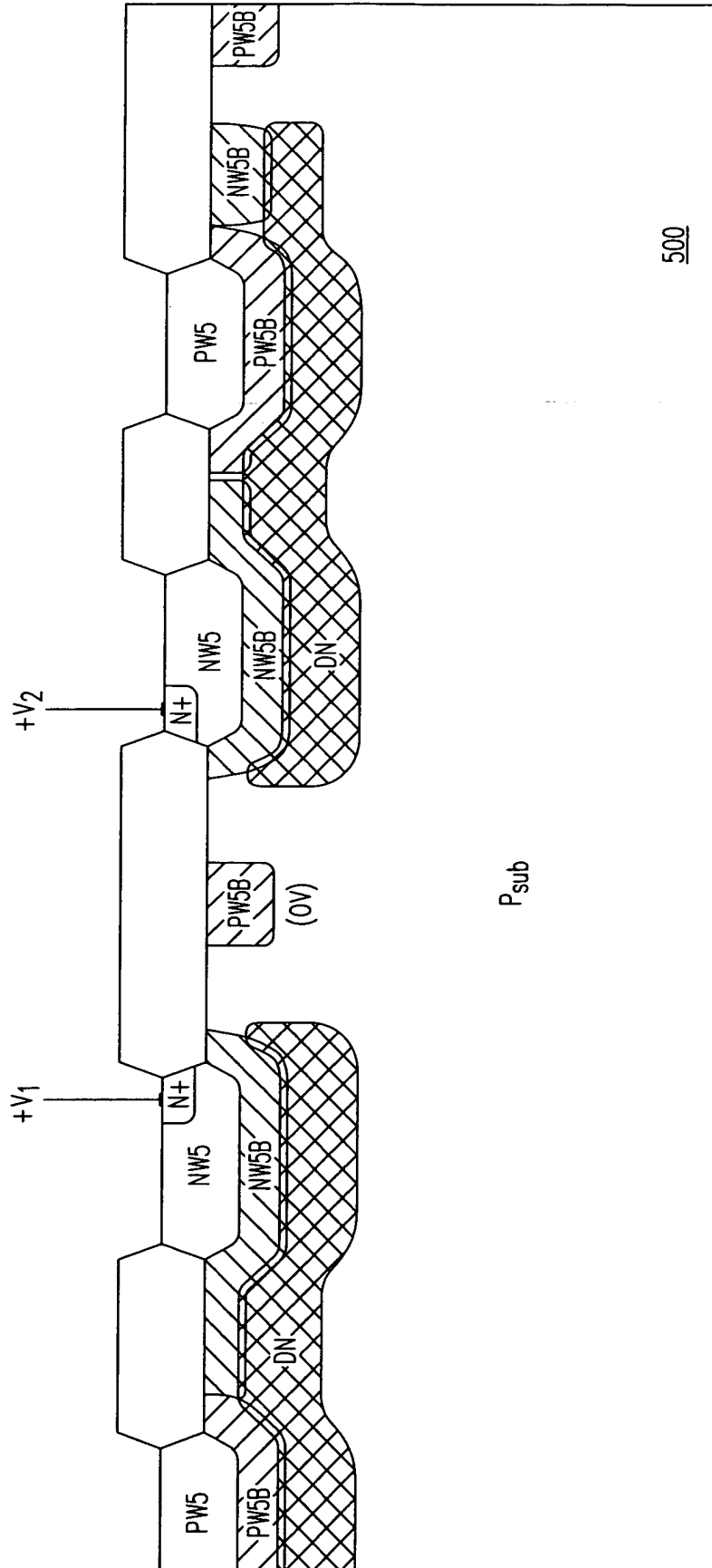


FIG. 16A

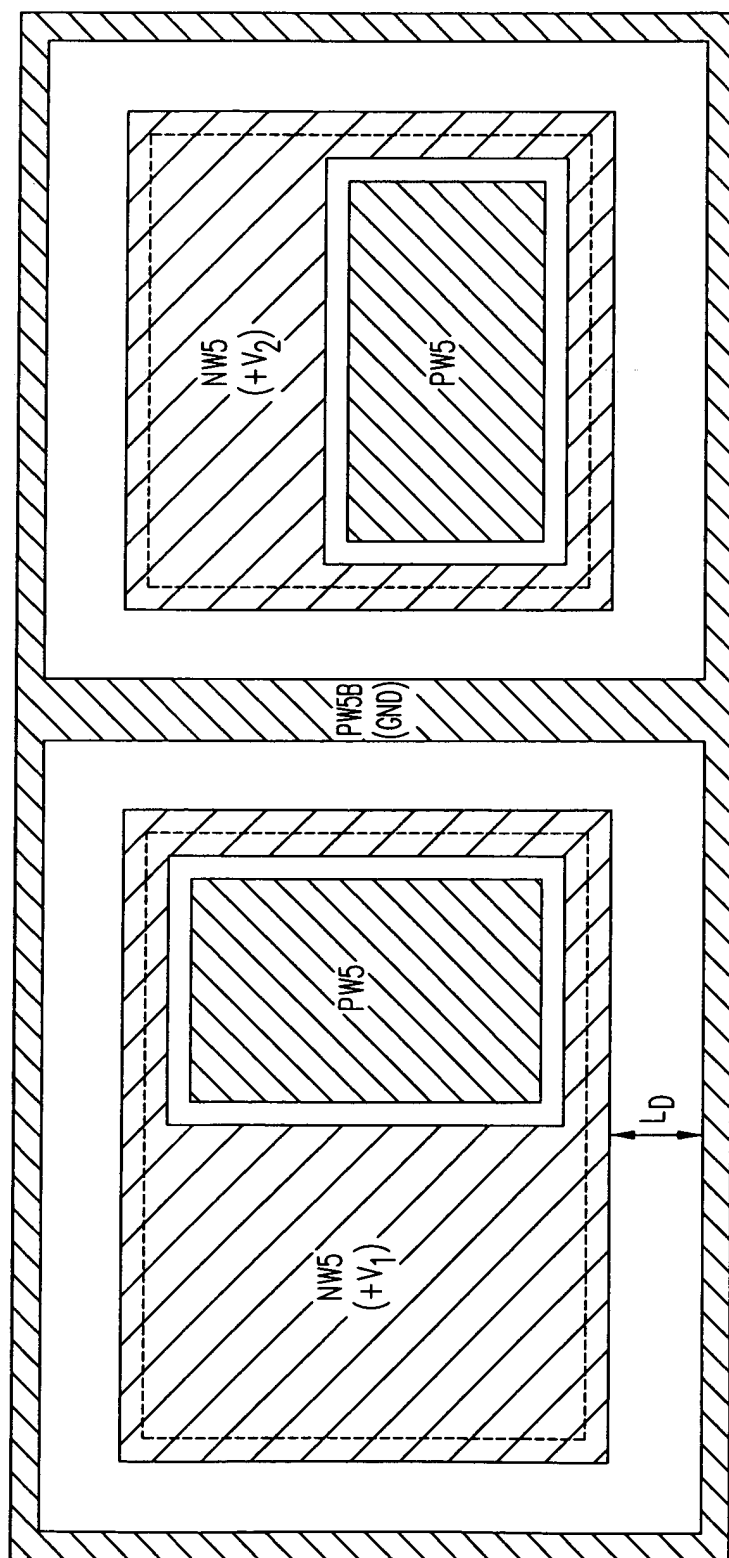


FIG. 16B

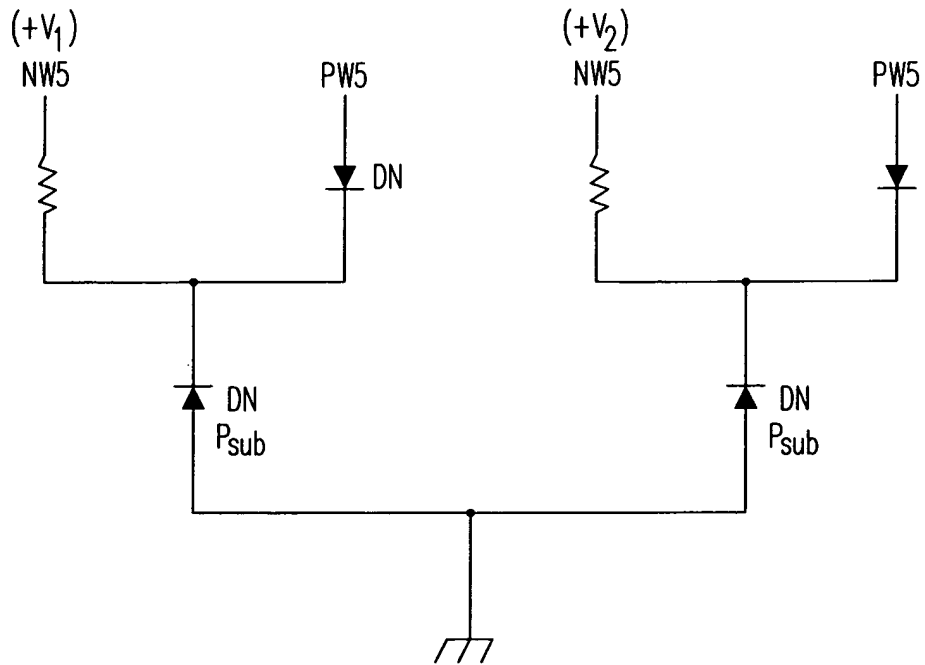


FIG. 16C

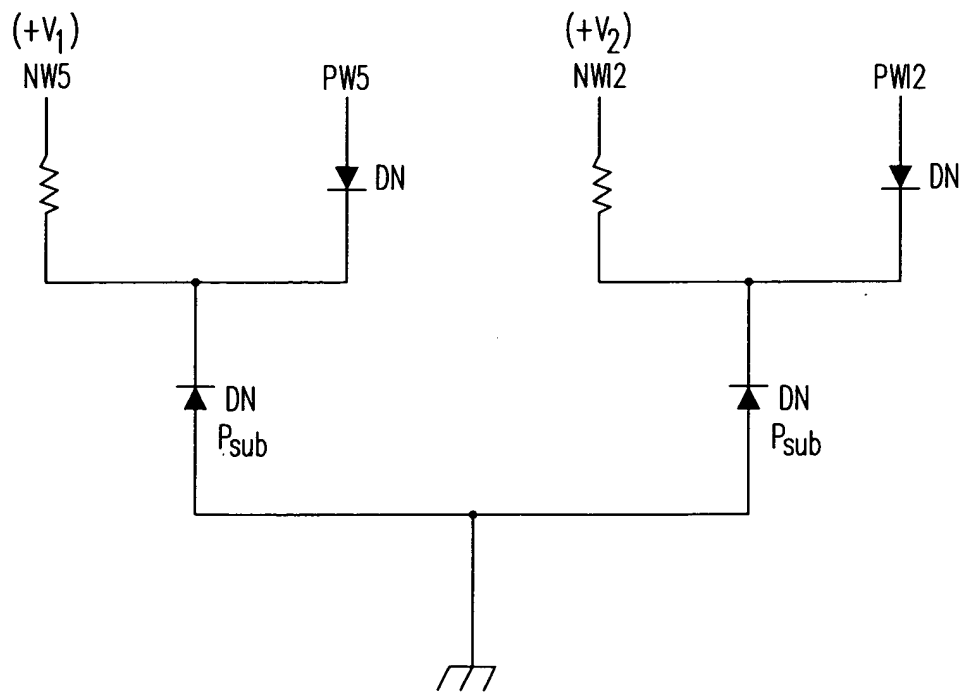


FIG. 16E

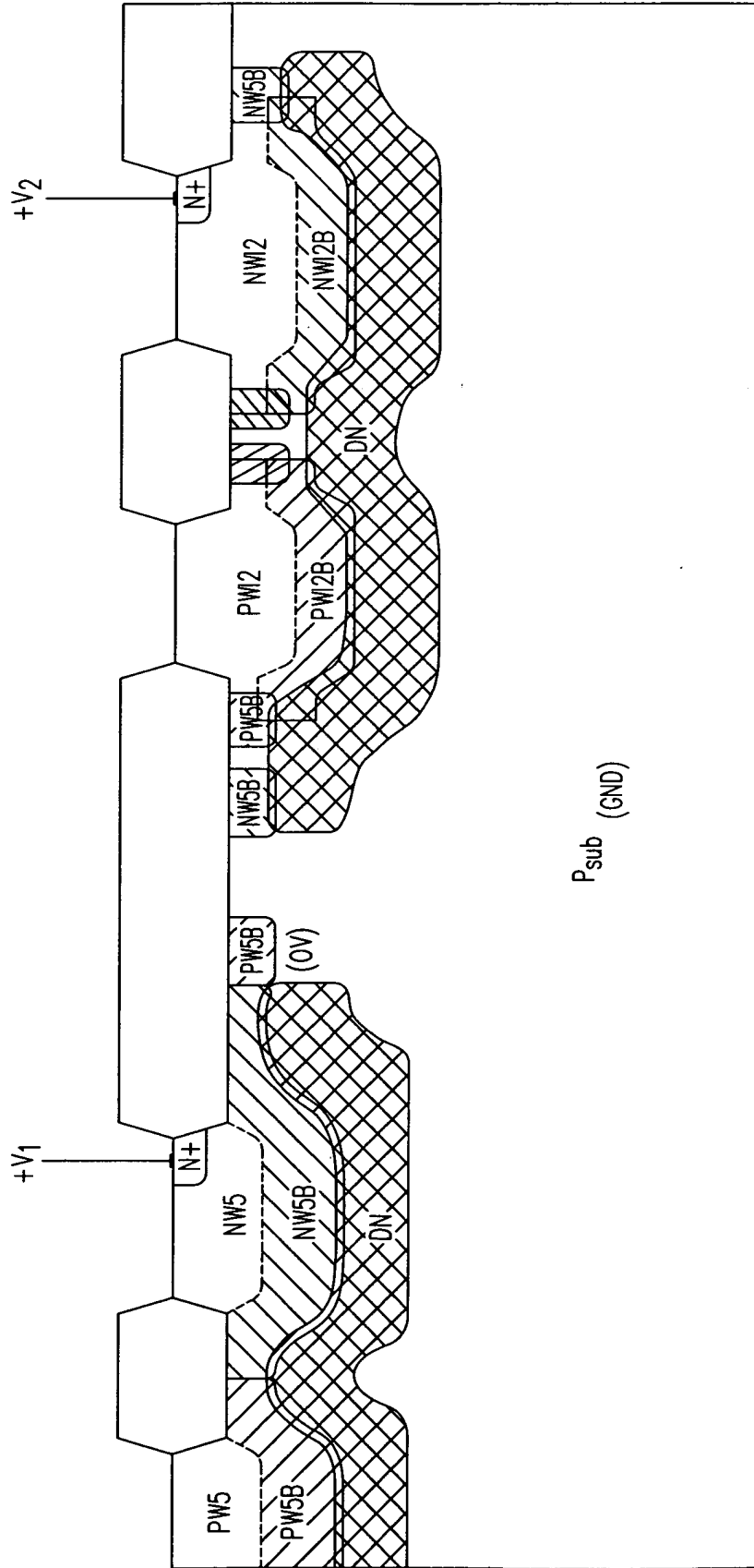


FIG. 16D

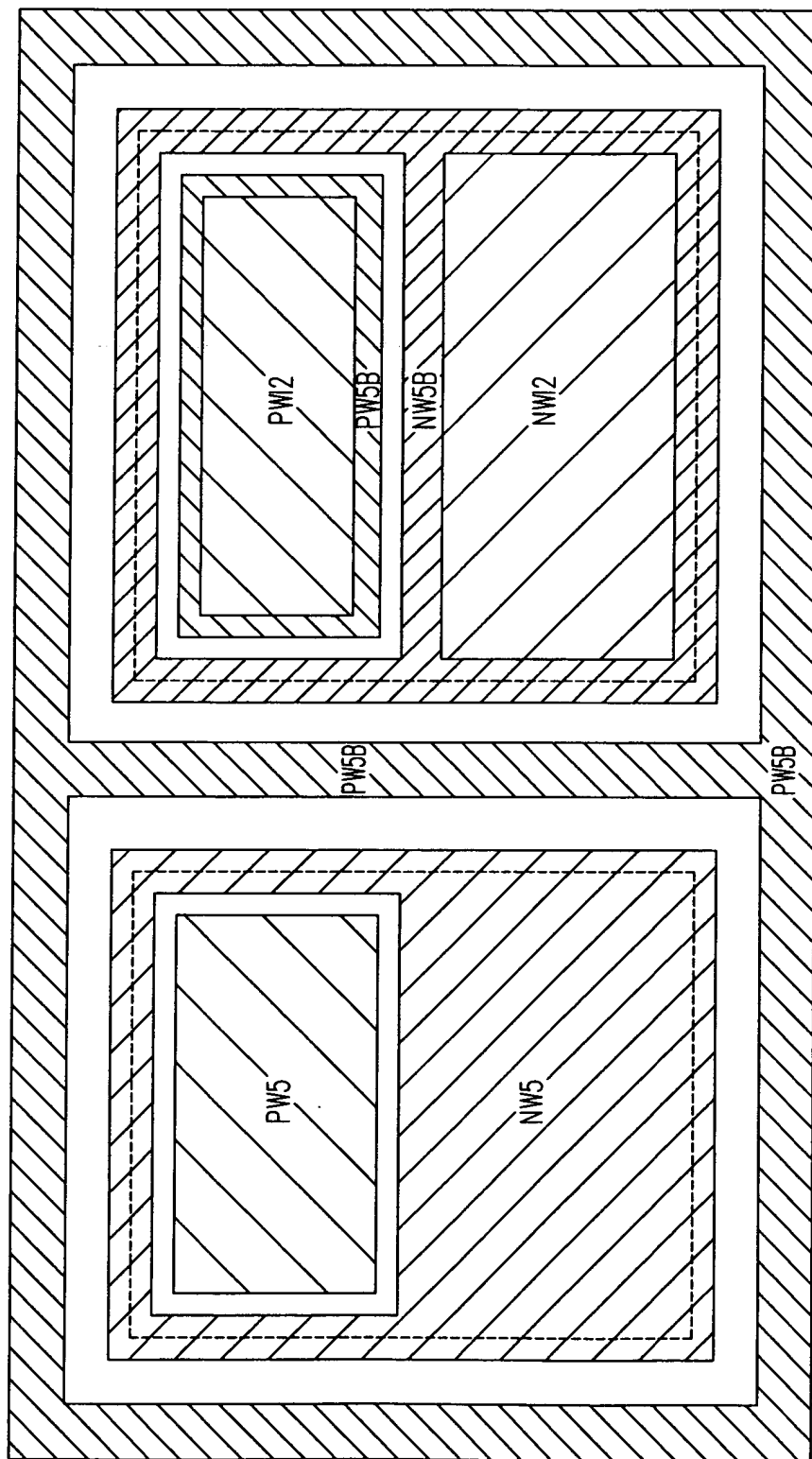


FIG. 16F

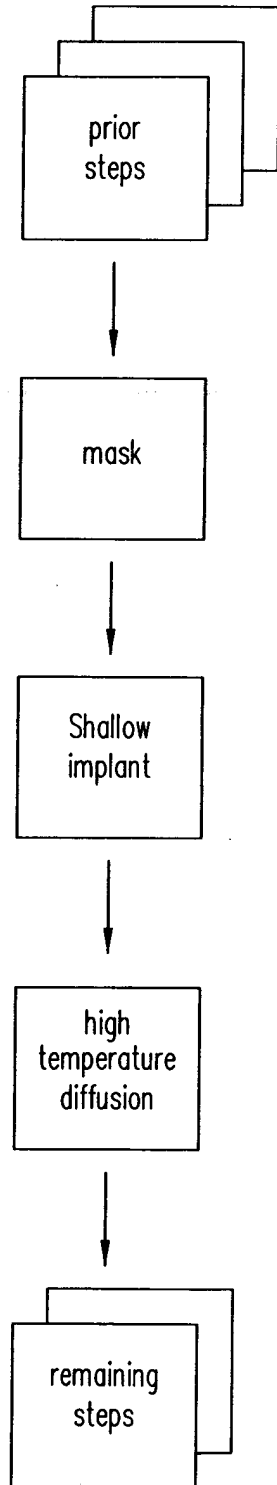


FIG. 17A
(Prior Art)

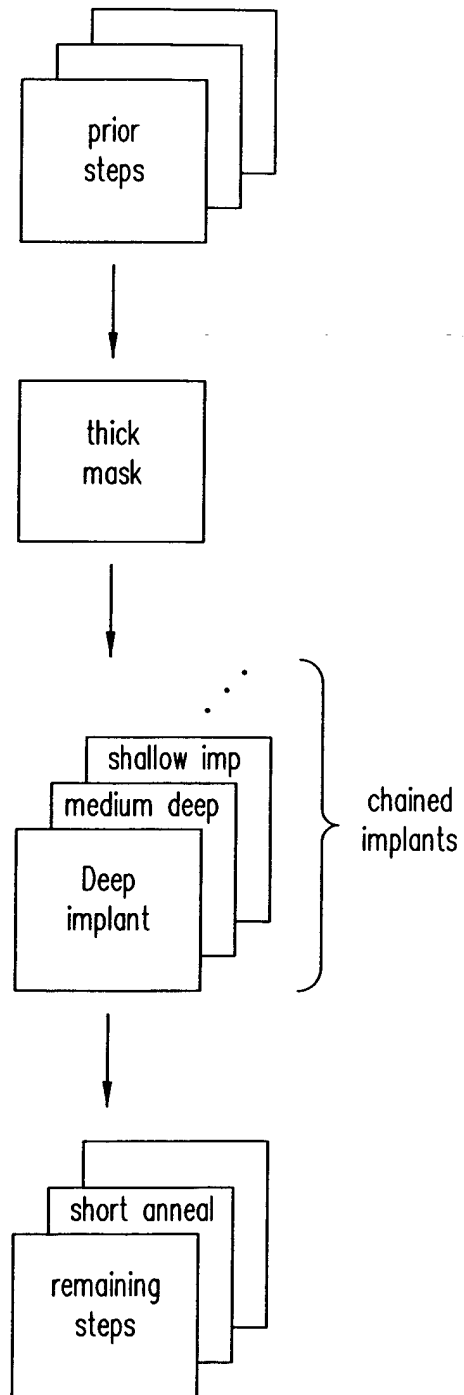


FIG. 17B

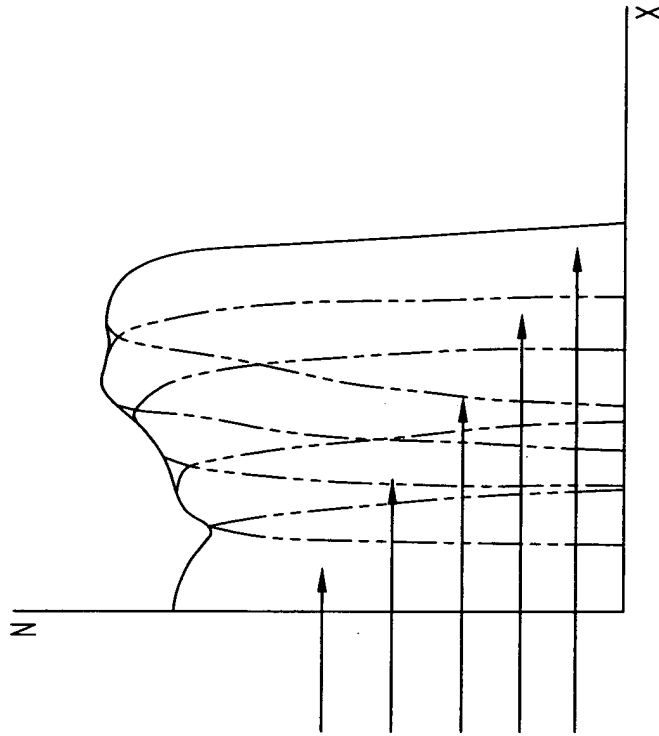


FIG. 17D

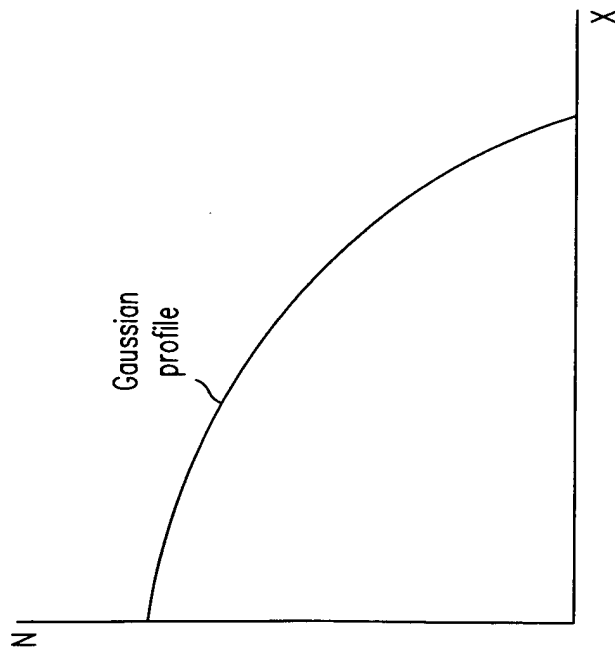


FIG. 17C
(Prior Art)

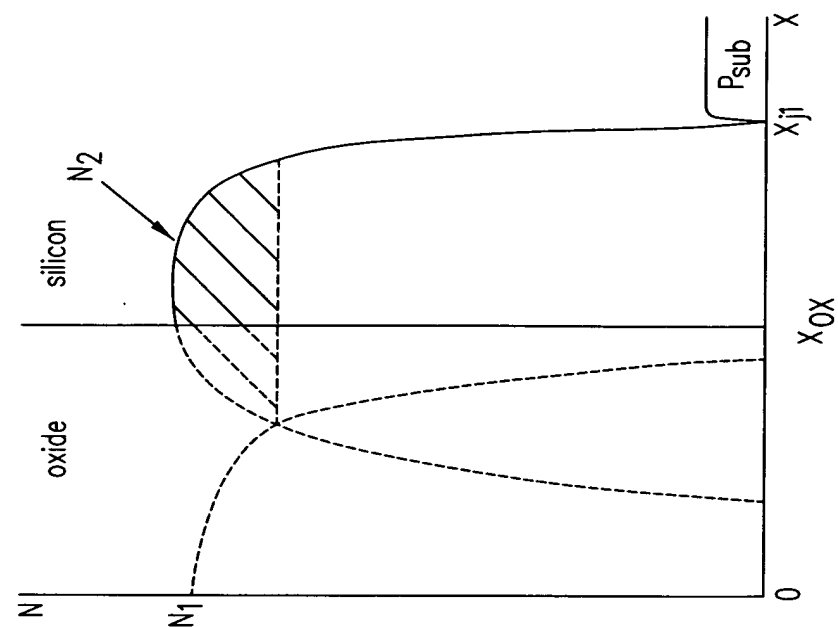
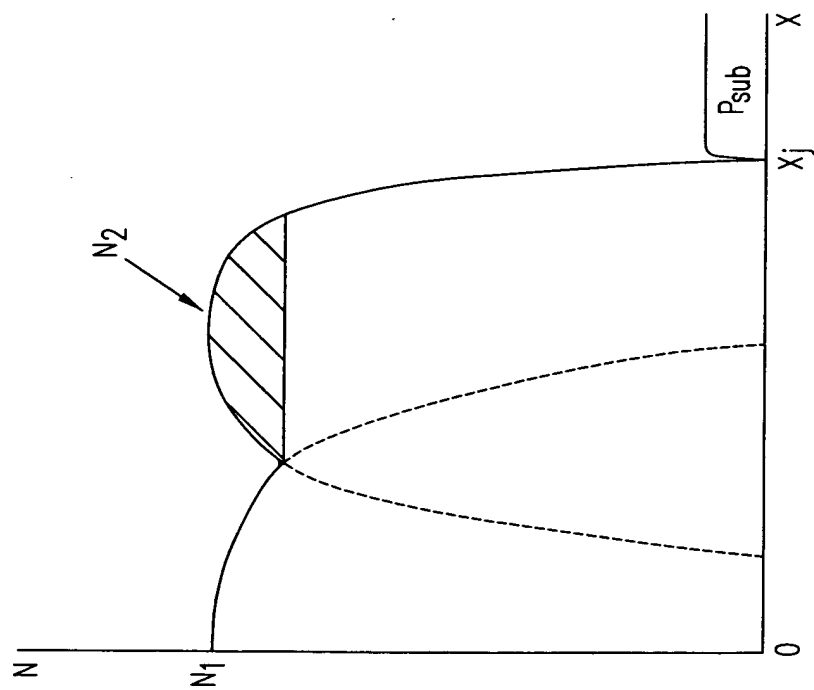


FIG. 17F



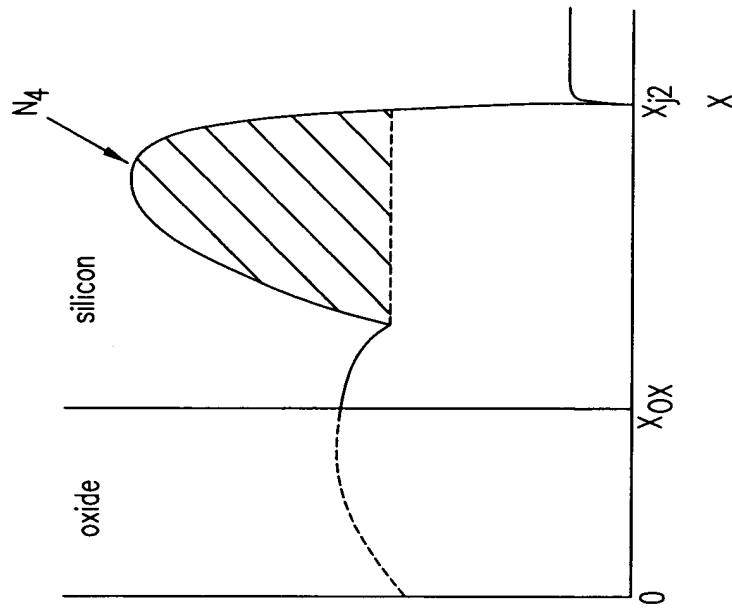


FIG. 17H

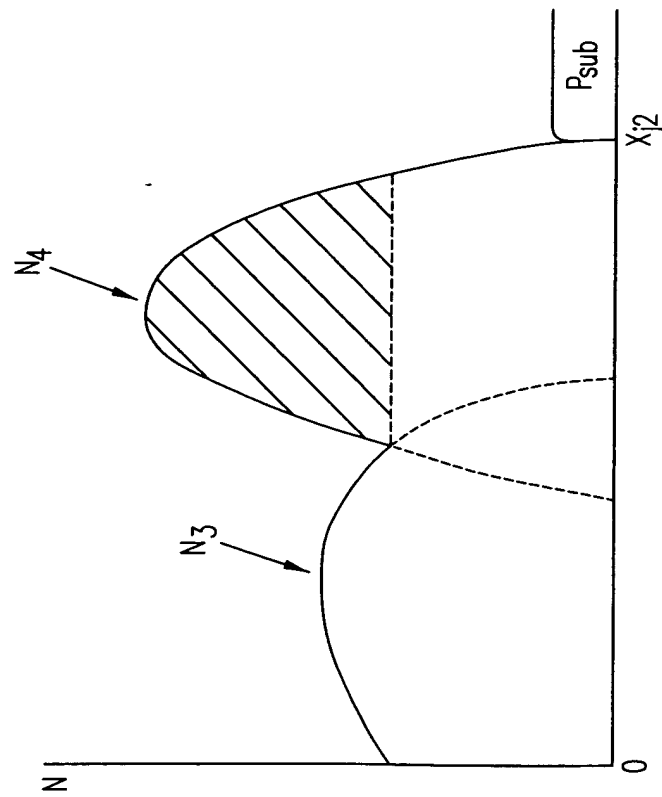


FIG. 17G

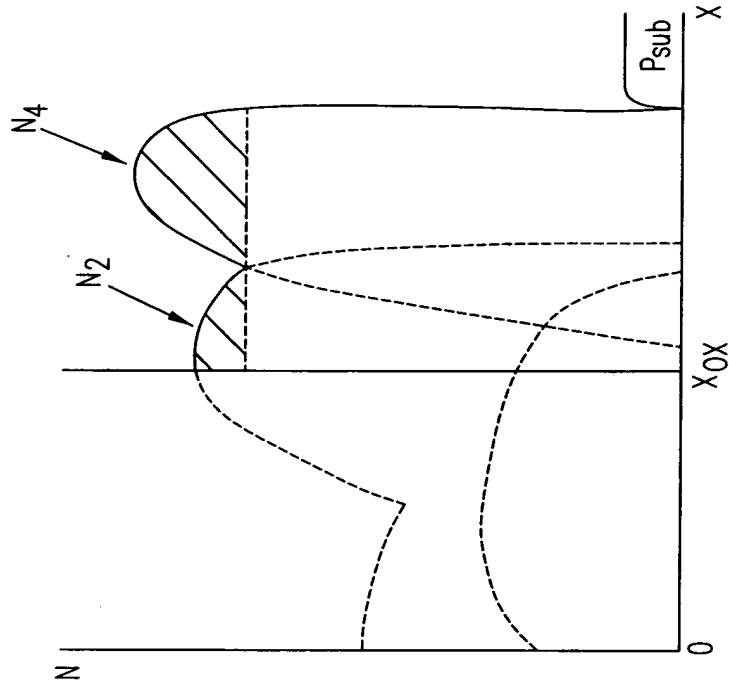


FIG. 17J

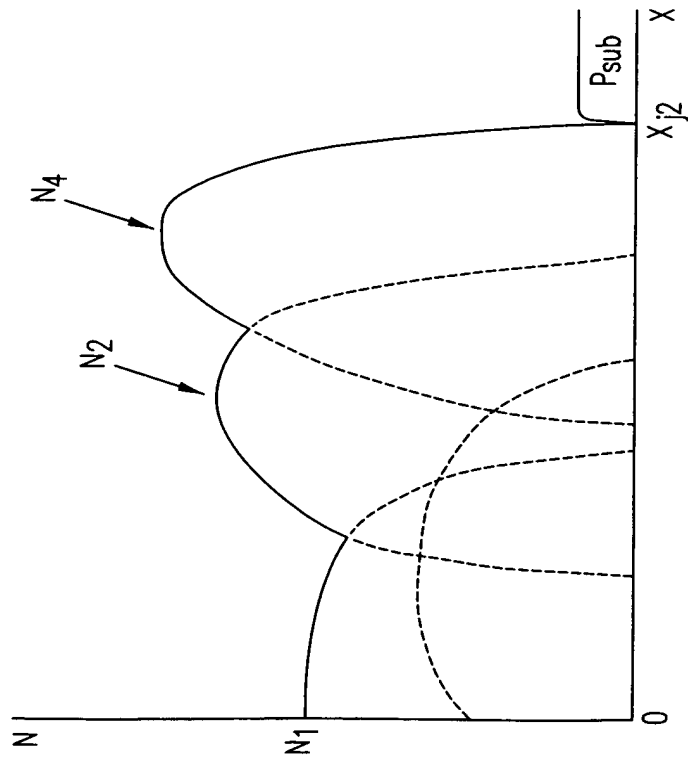


FIG. 17I

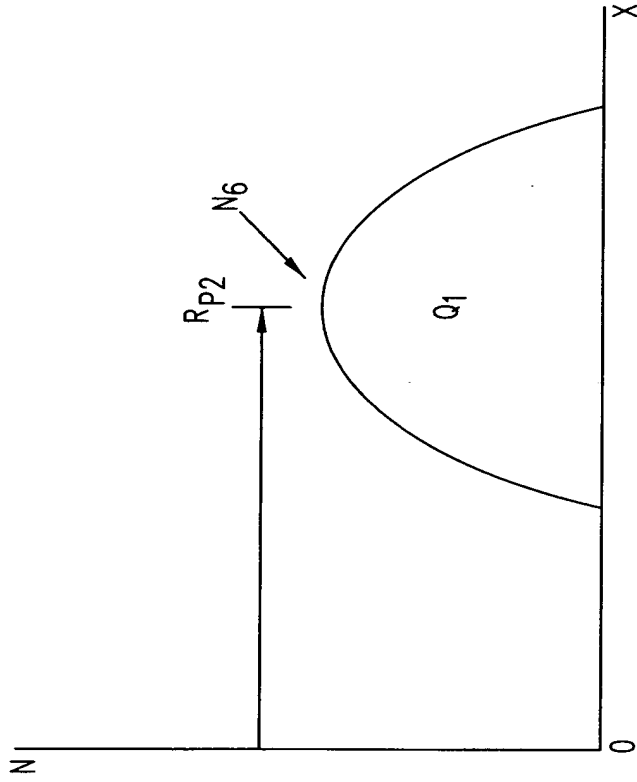


FIG. 17K
(Prior Art)

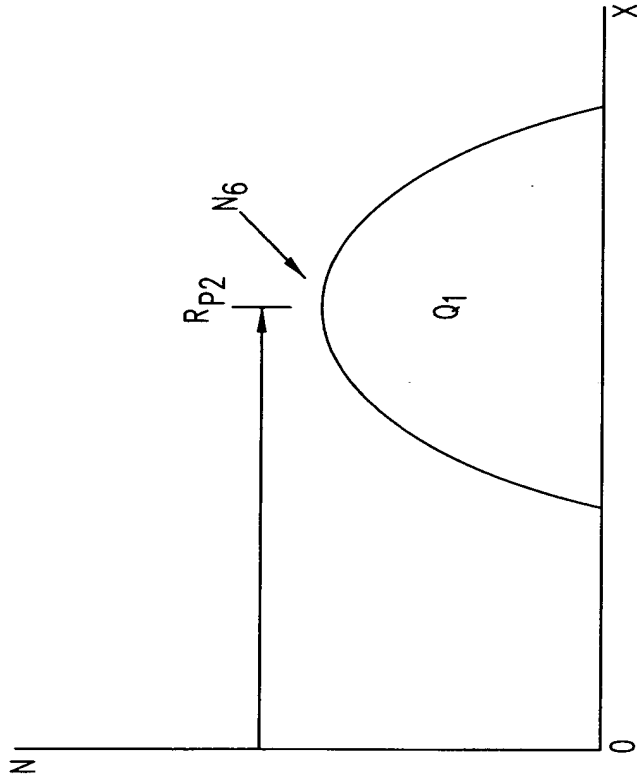


FIG. 17L
(Prior Art)

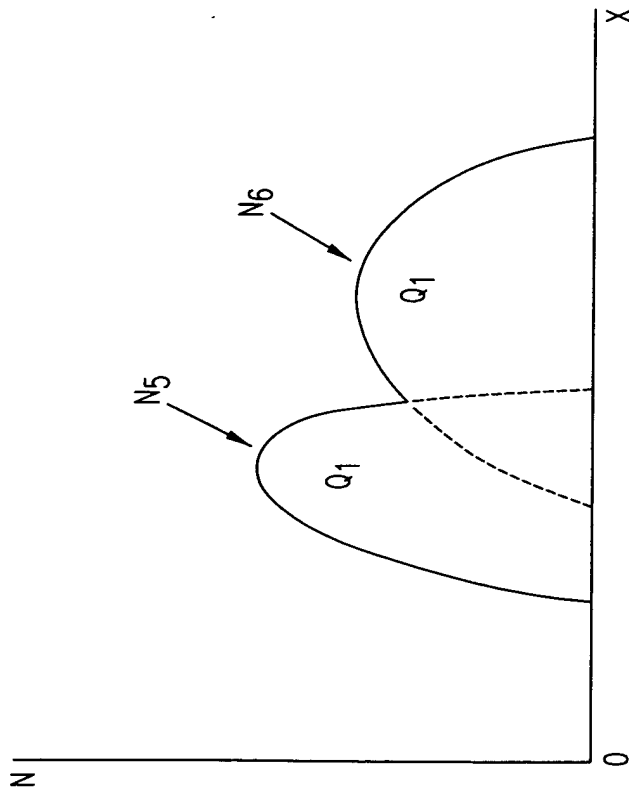


FIG. 17M

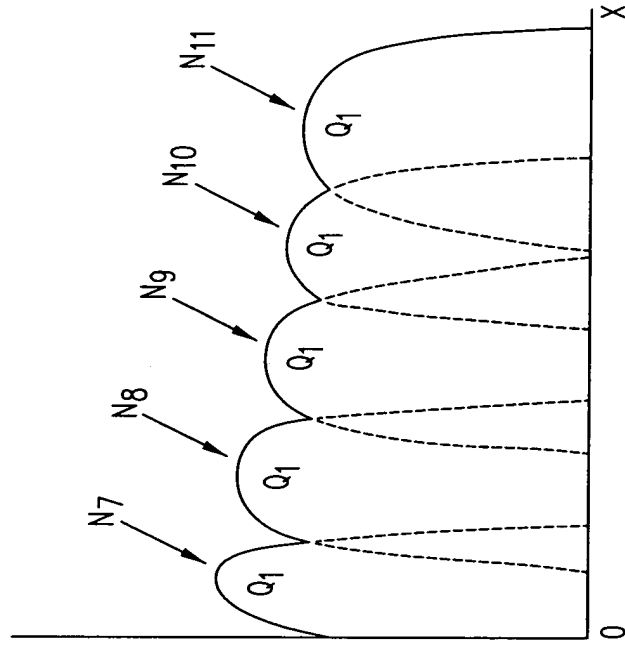


FIG. 17N

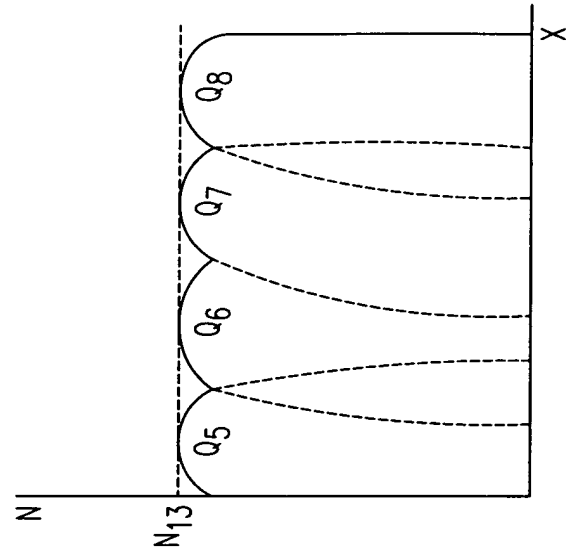


FIG. 17P

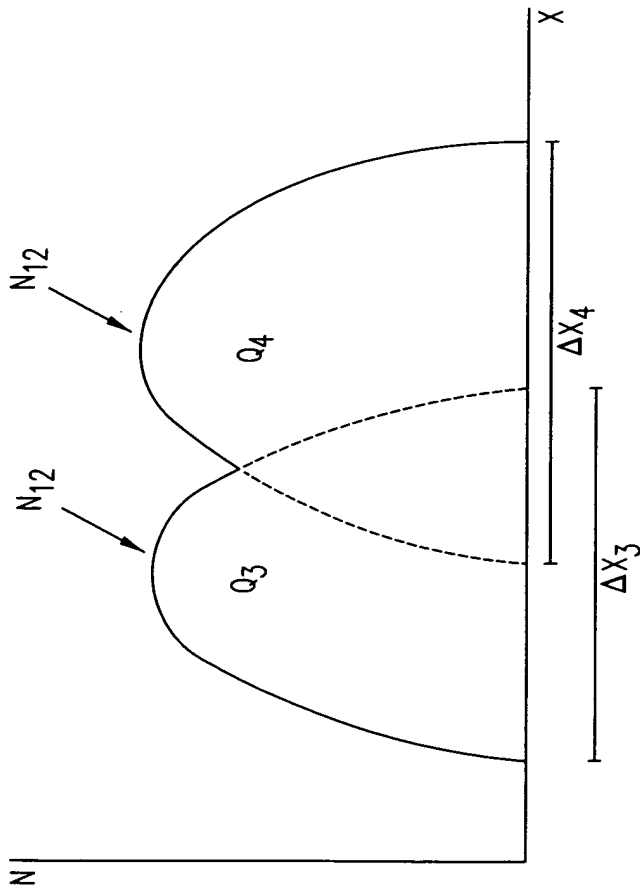


FIG. 17Q

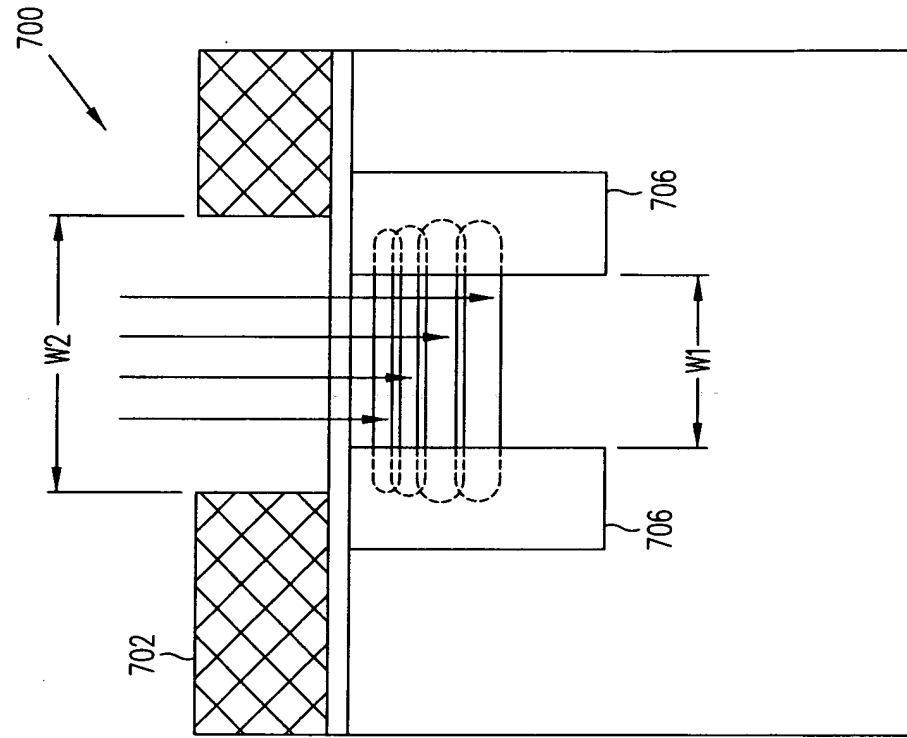


FIG. 17S

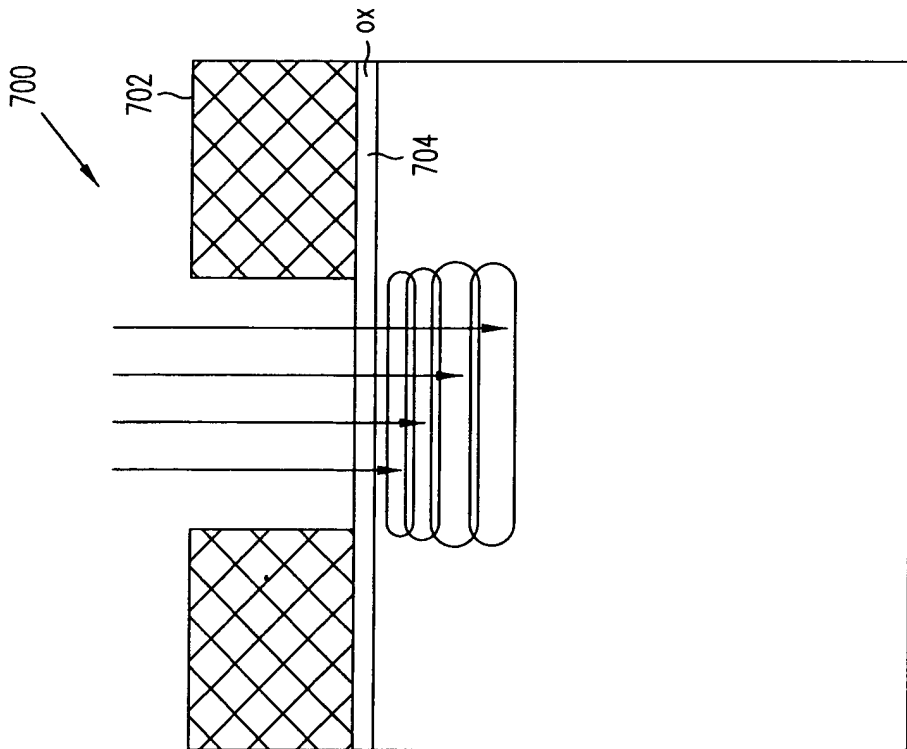


FIG. 17R

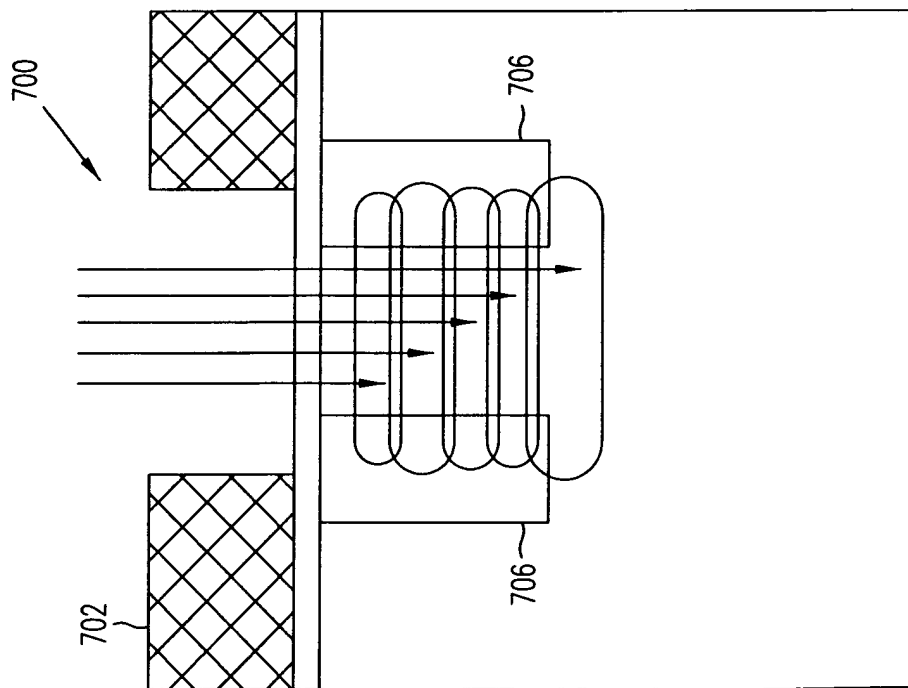


FIG. 17T

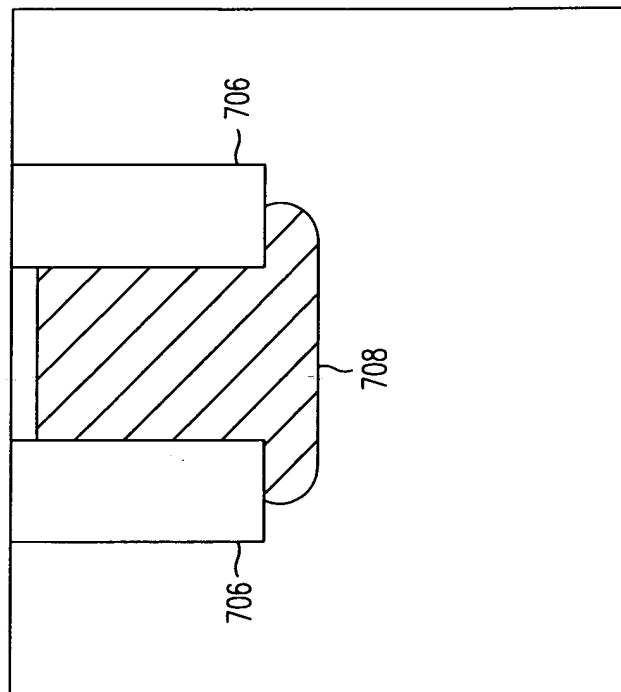


FIG. 17U

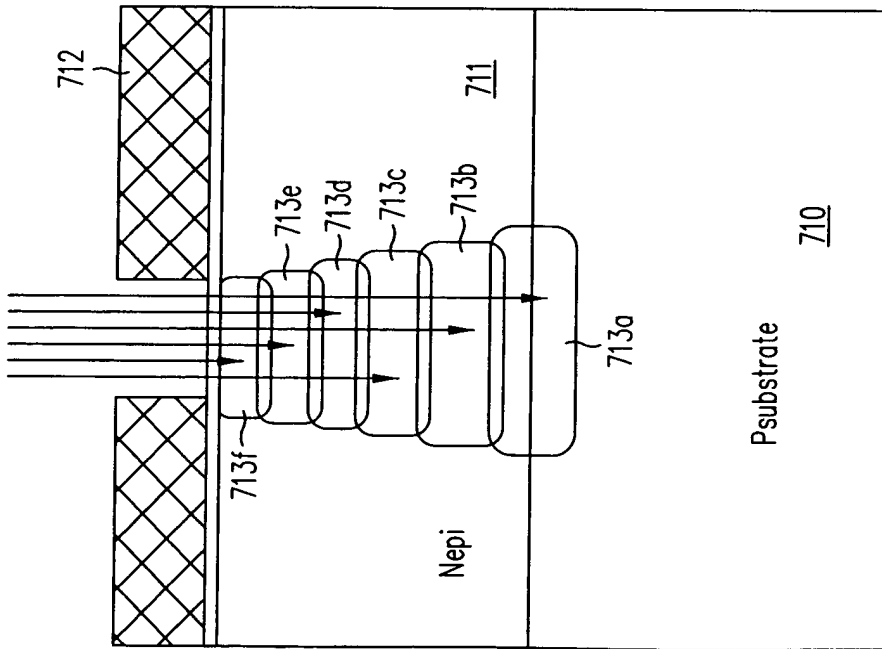


FIG. 17U

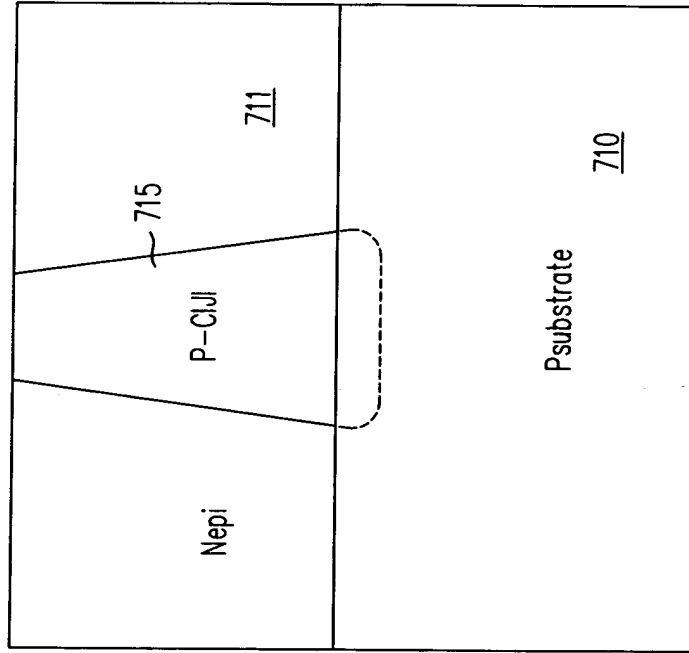


FIG. 17V

712

713g

720a

713c

713b

713a

711

Nepi

720b

713d

713e

713f

Psubstrate

FIG. 17W

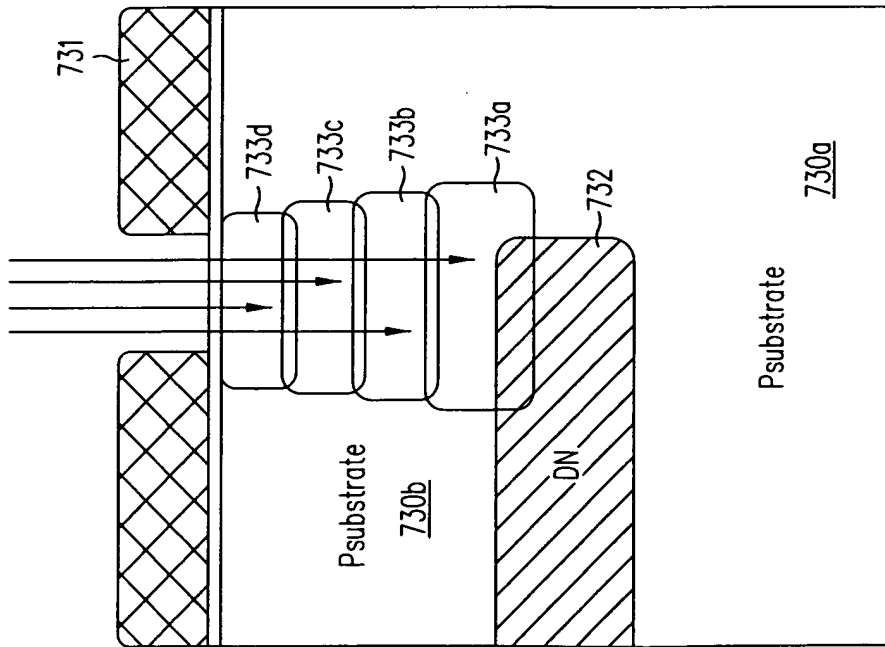


FIG. 17Y

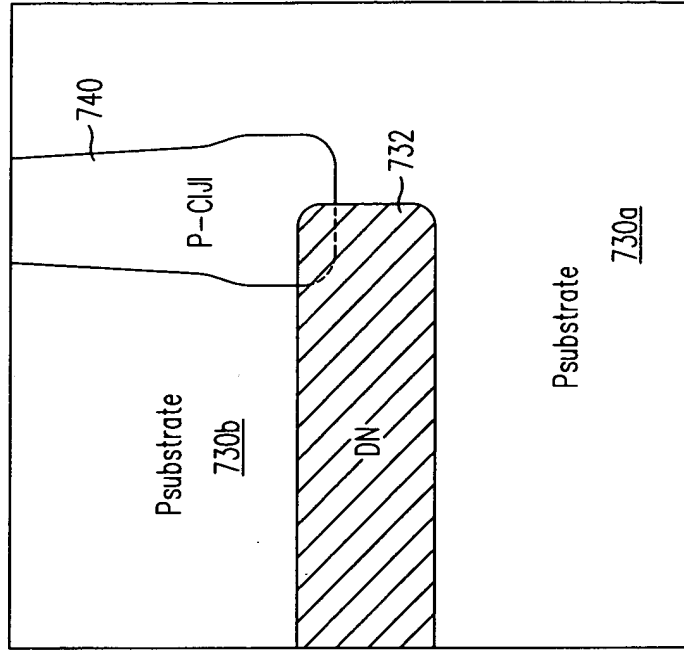


FIG. 17Z

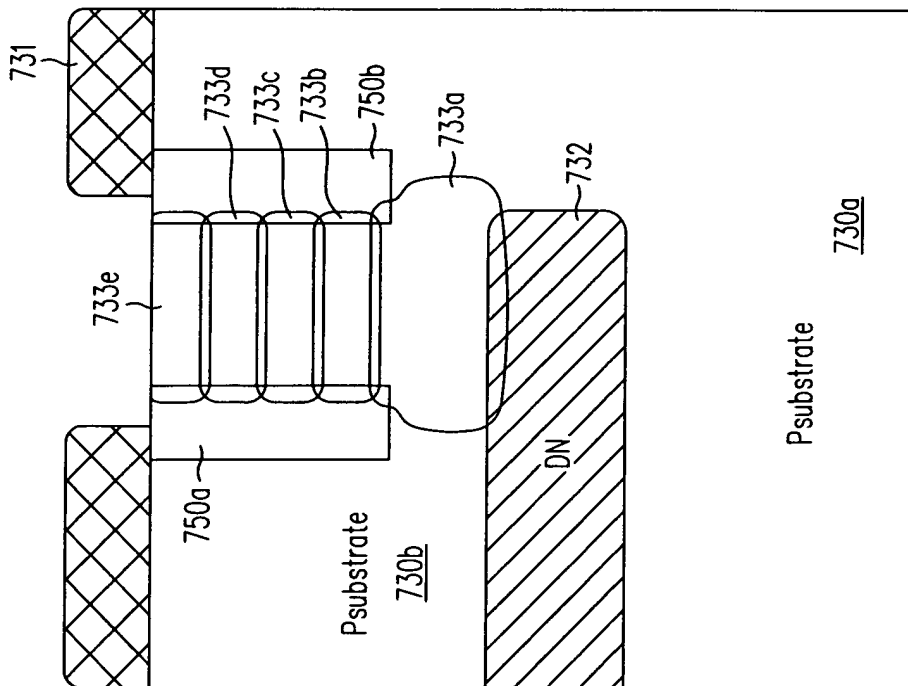


FIG. 17AA

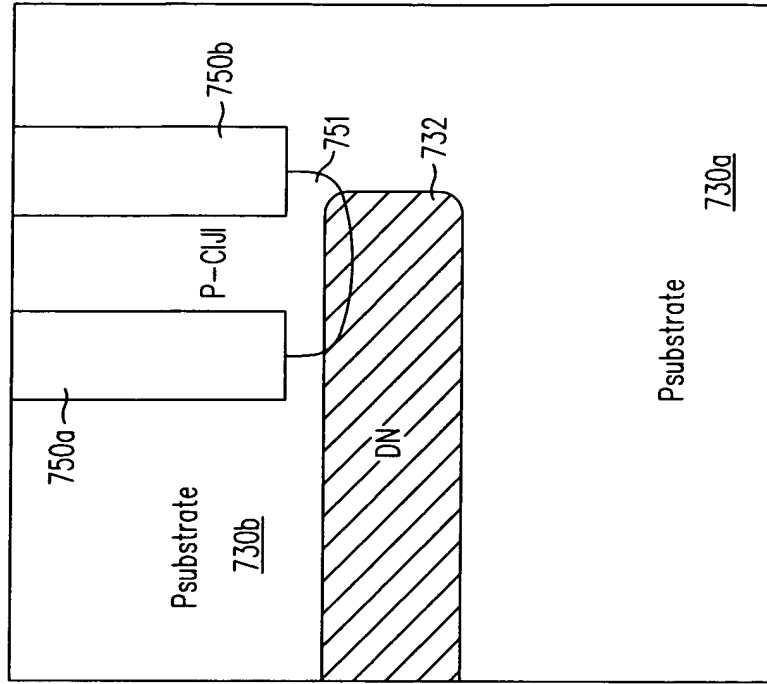


FIG. 17BB

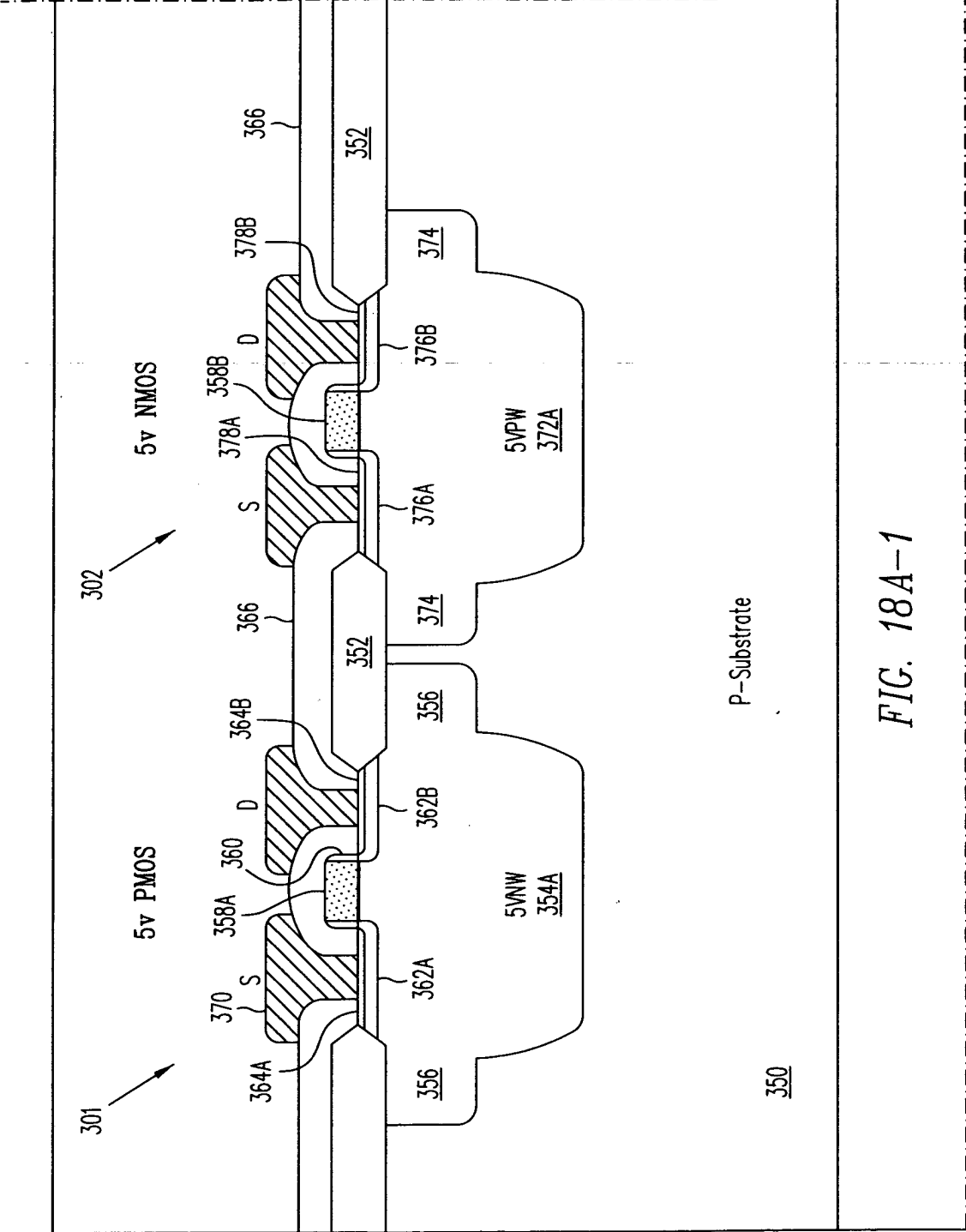


FIG. 18A-1	FIG. 18A-2
FIG. 18A-3	FIG. 18A-4

Key To
FIG. 18A

FIG. 18A-1

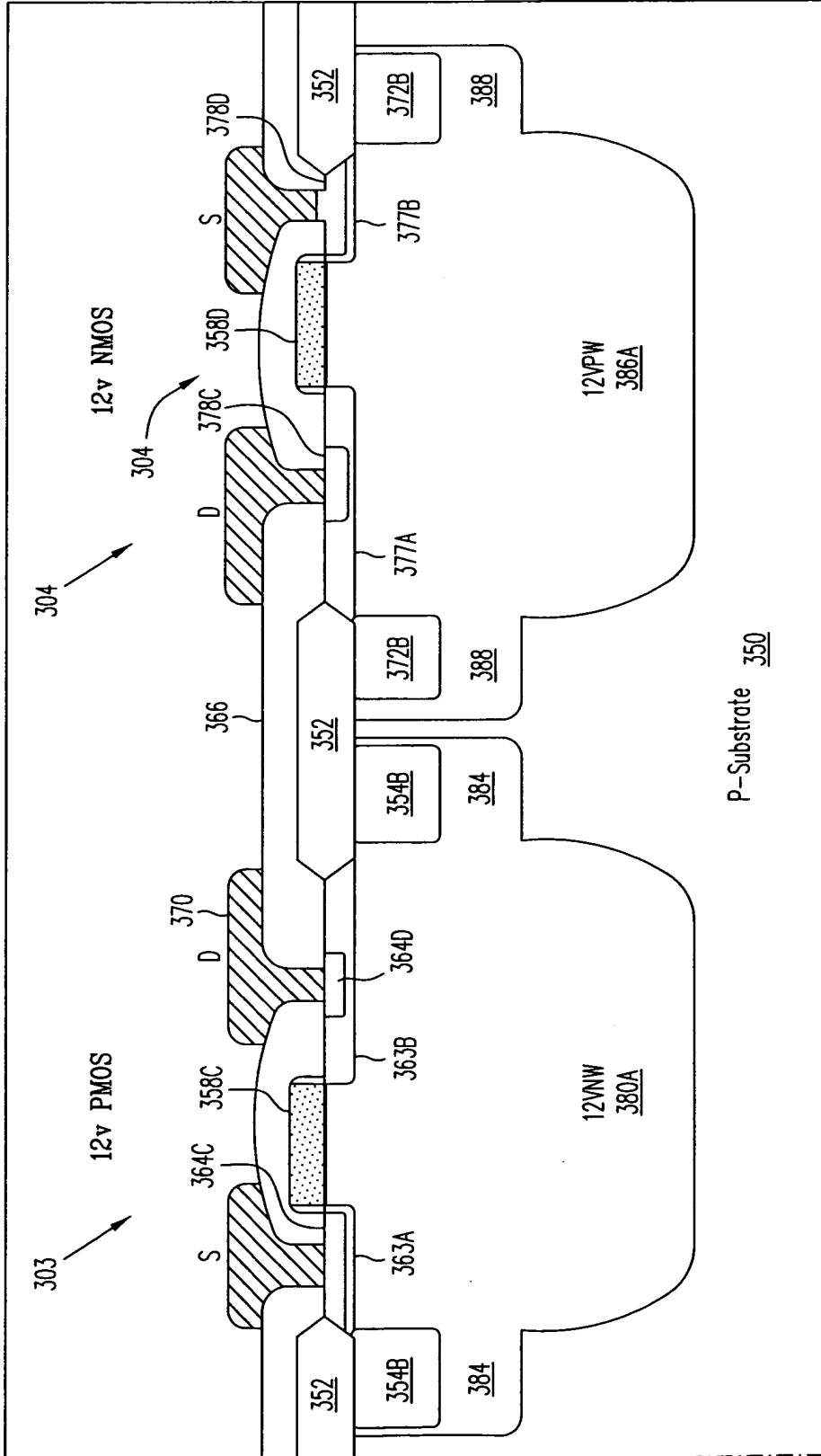


FIG. 18A-2

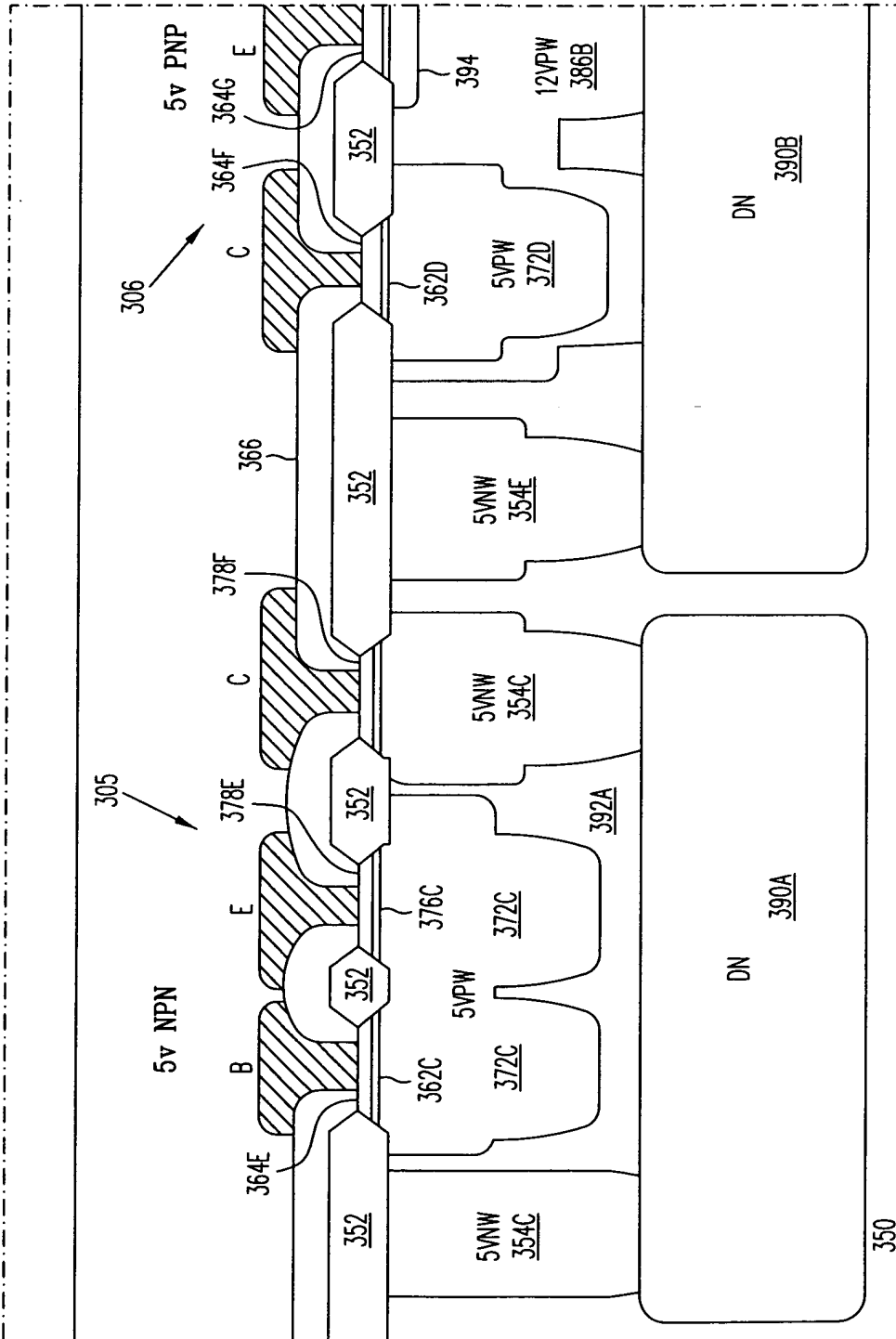


FIG. 18A-3

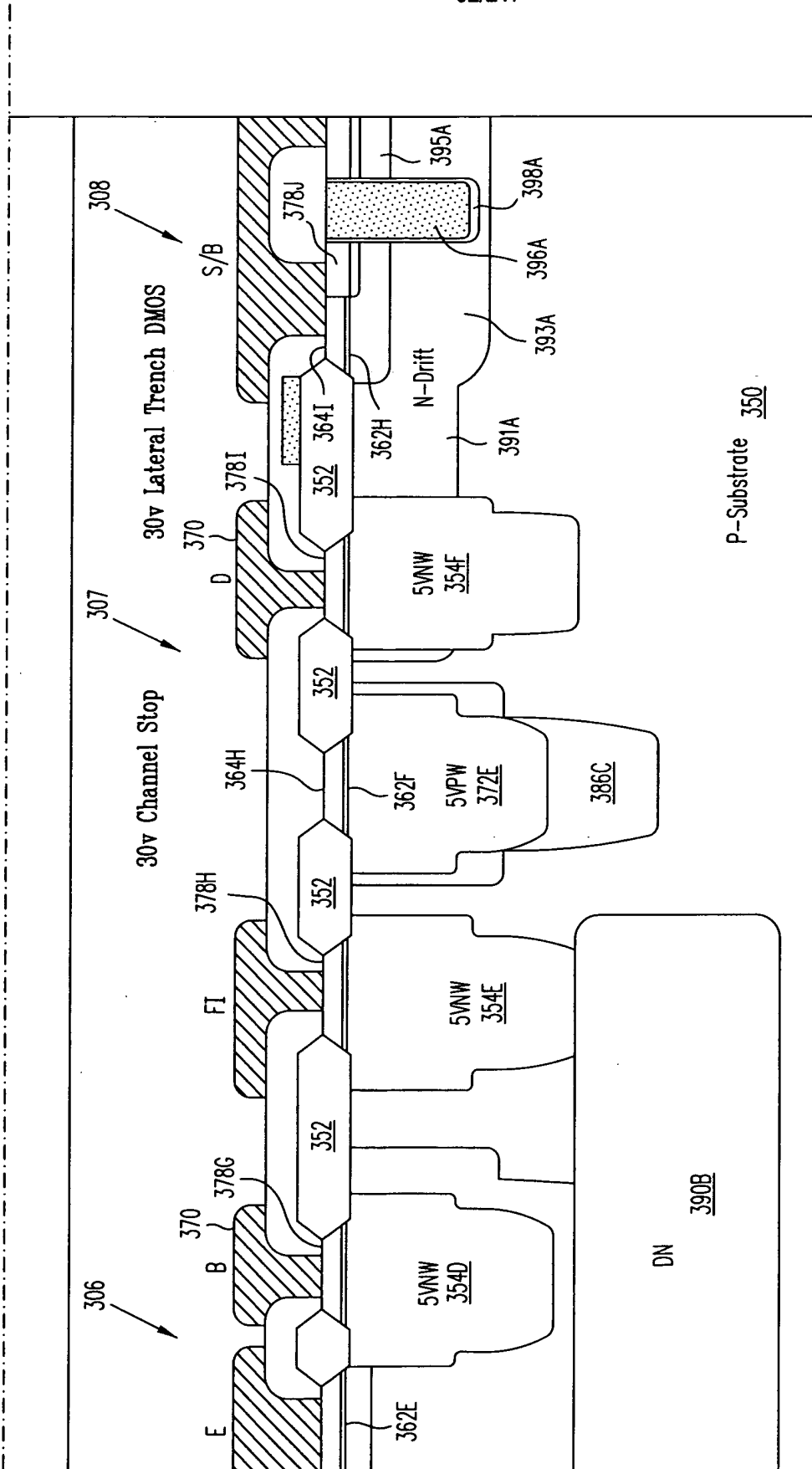


FIG. 18A-4

FIG. 18B-1

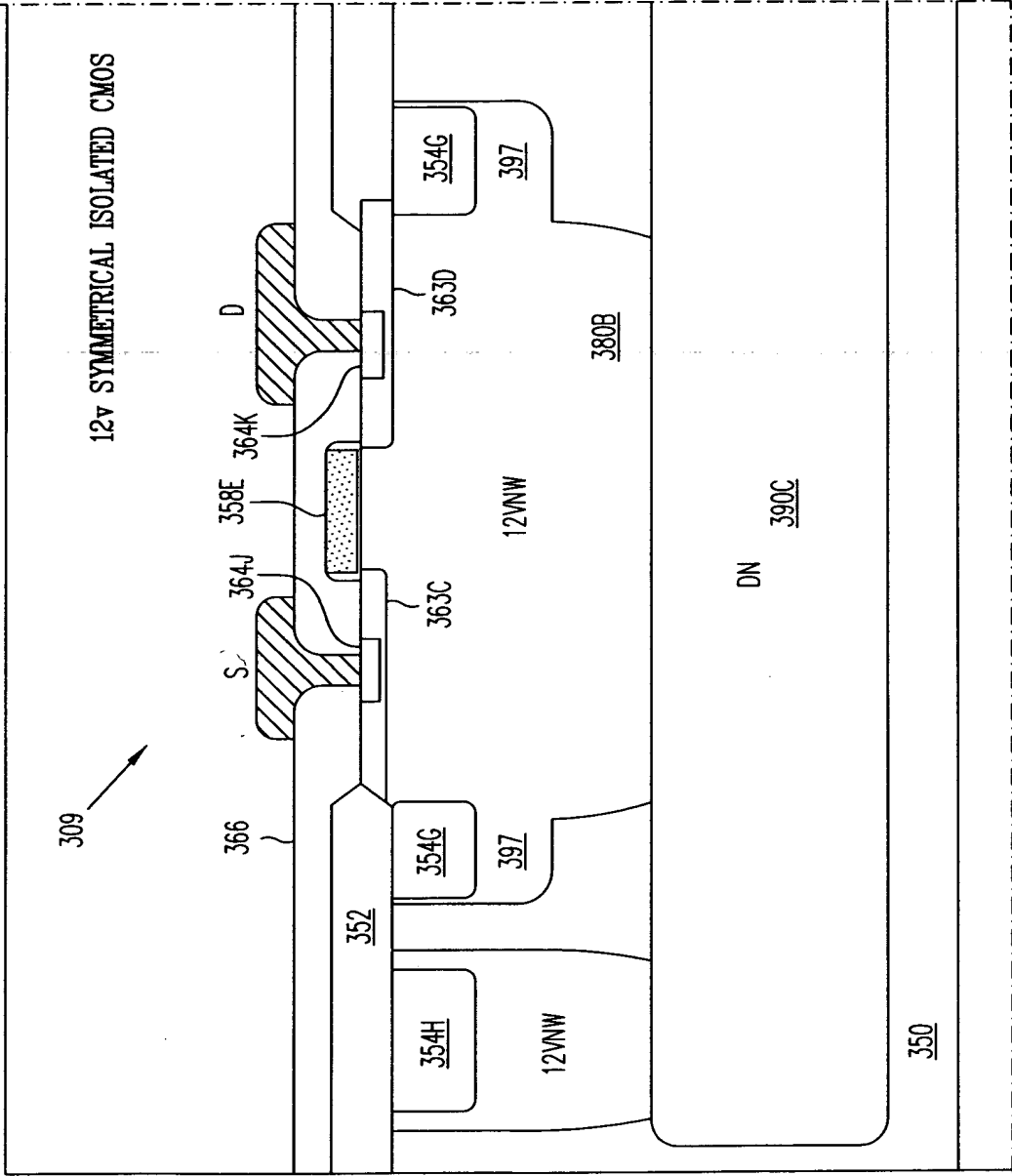
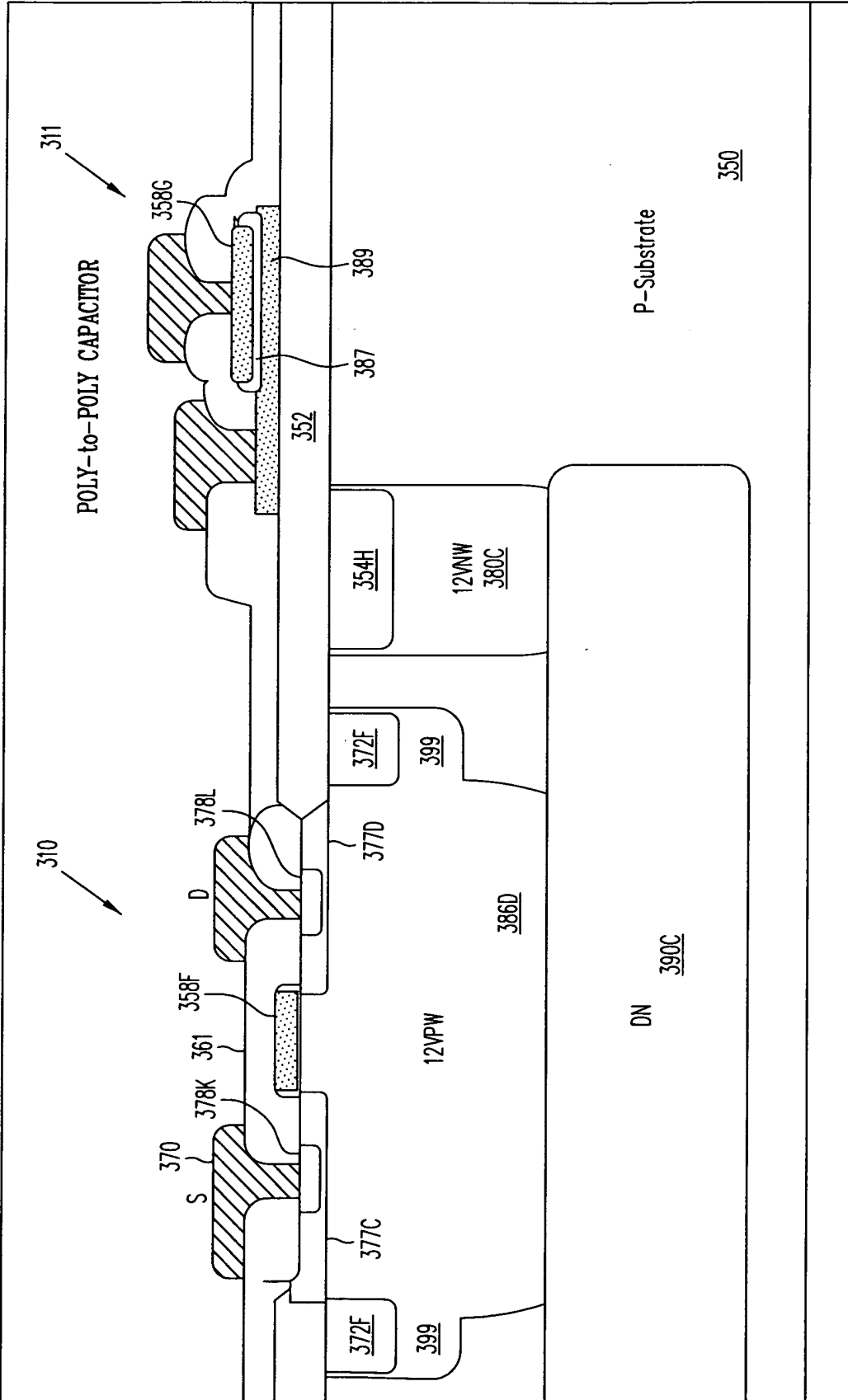


FIG. 18B-1	FIG. 18B-2
FIG. 18B-3	FIG. 18B-4

Key To
FIG. 18B

FIG. 18B-2



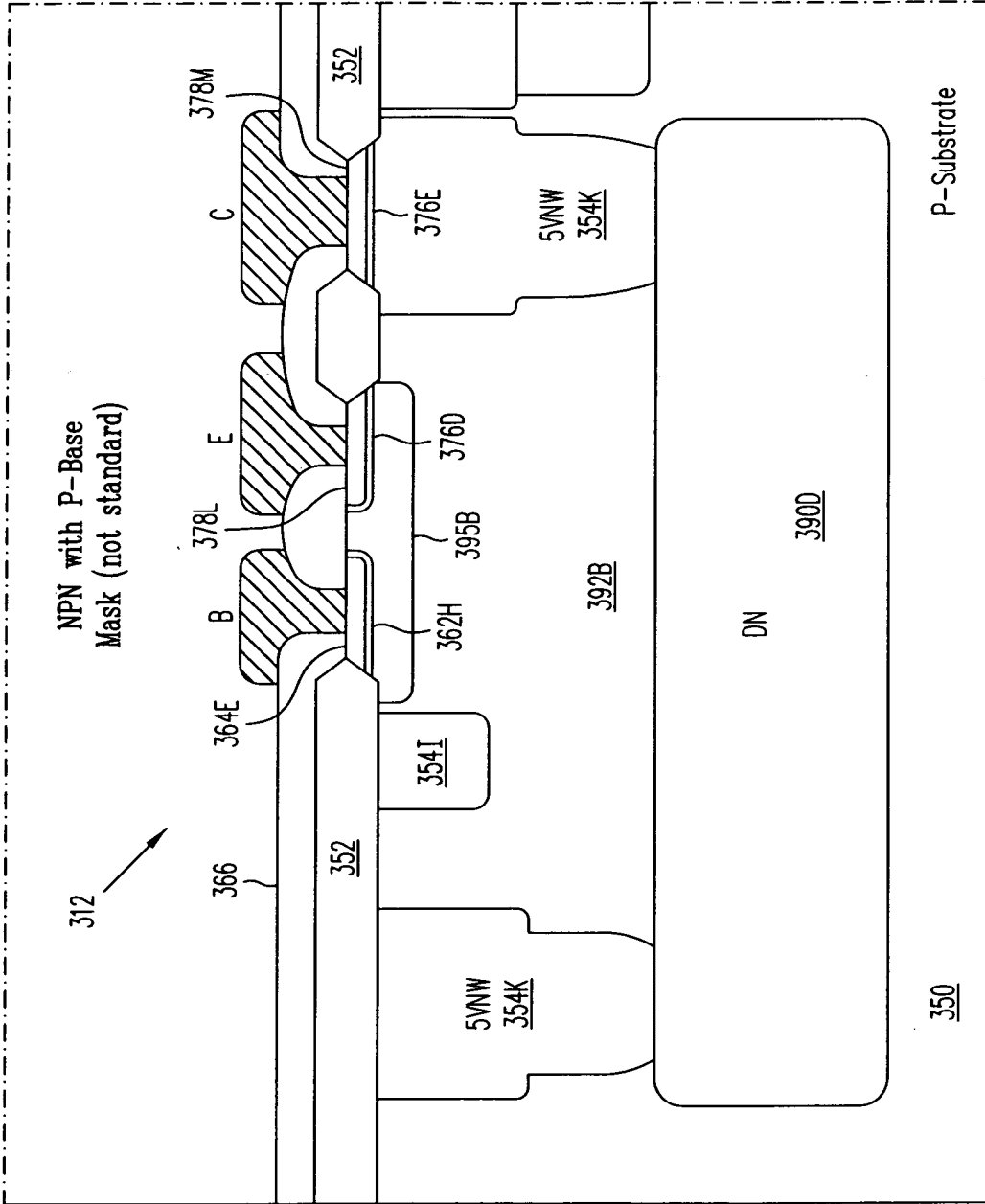


FIG. 18B-3

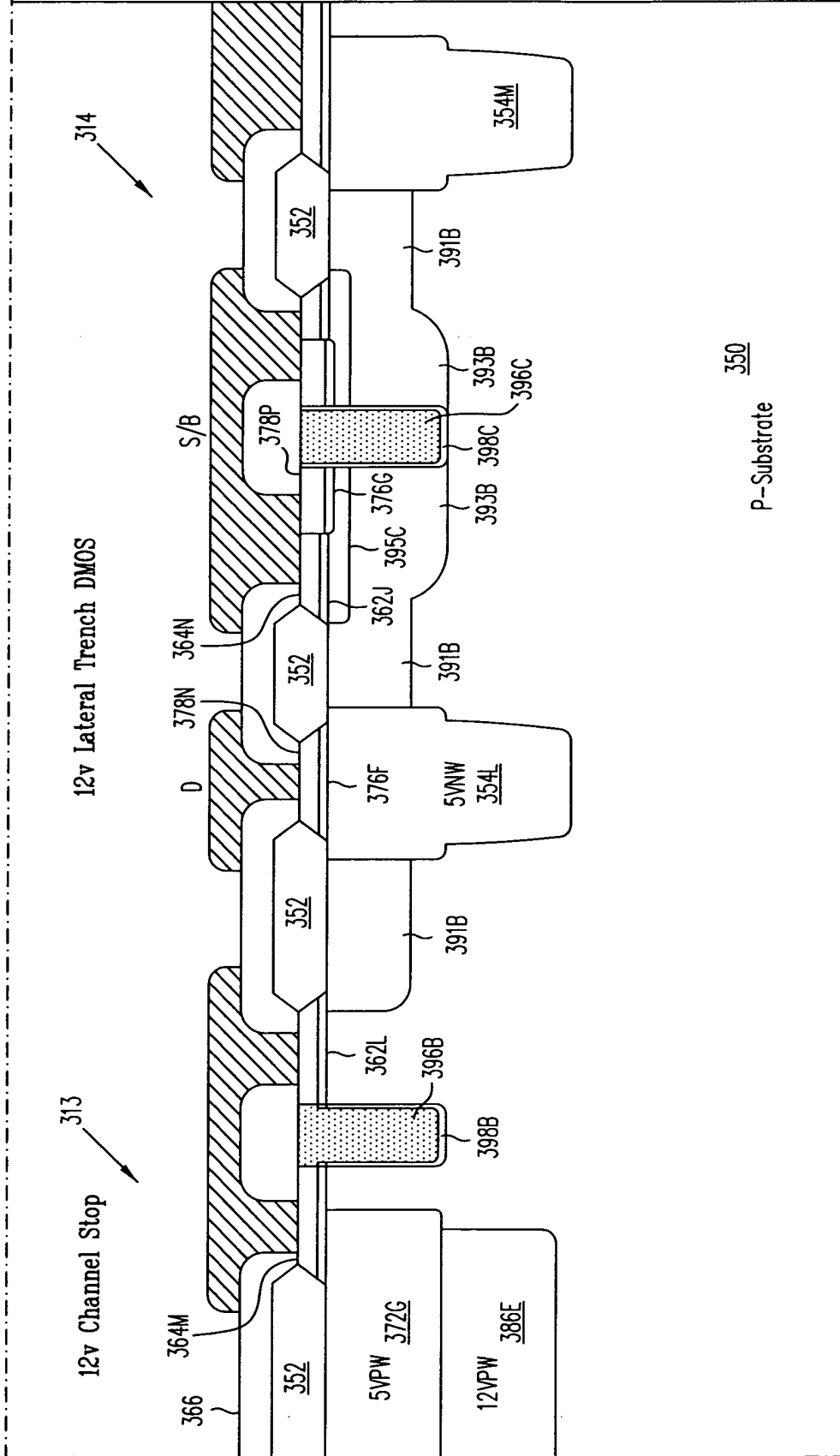
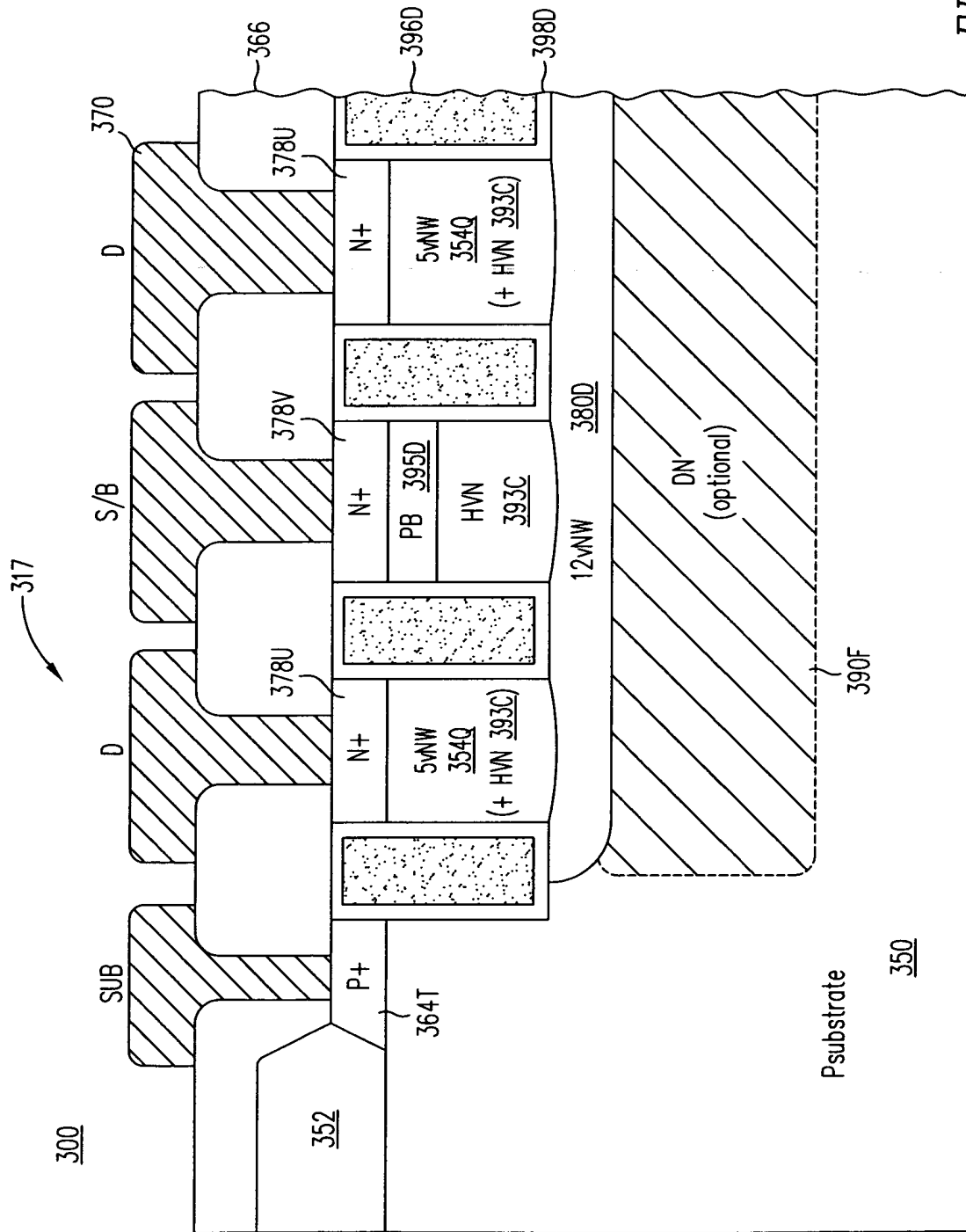


FIG. 18B-4



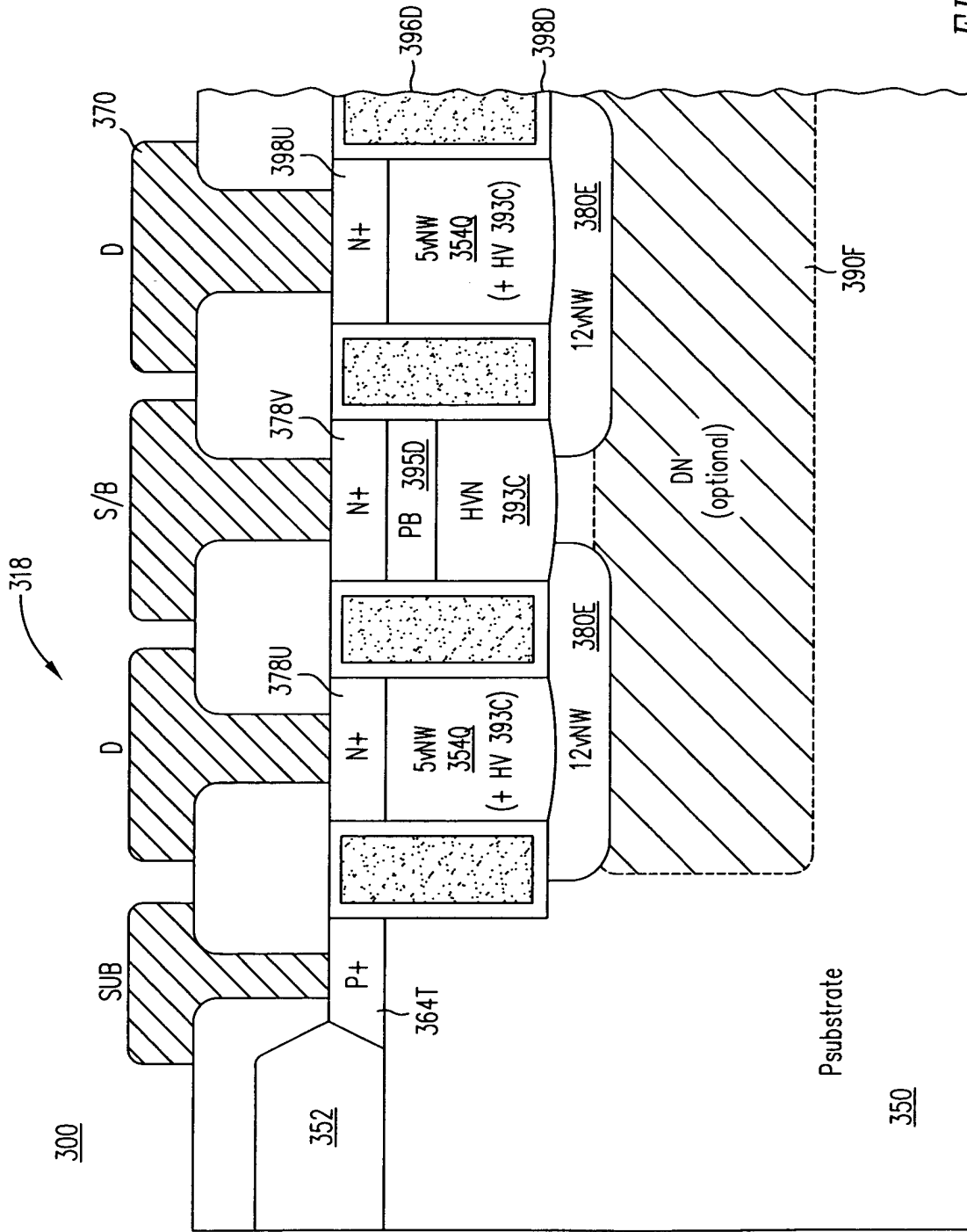


FIG. 18E

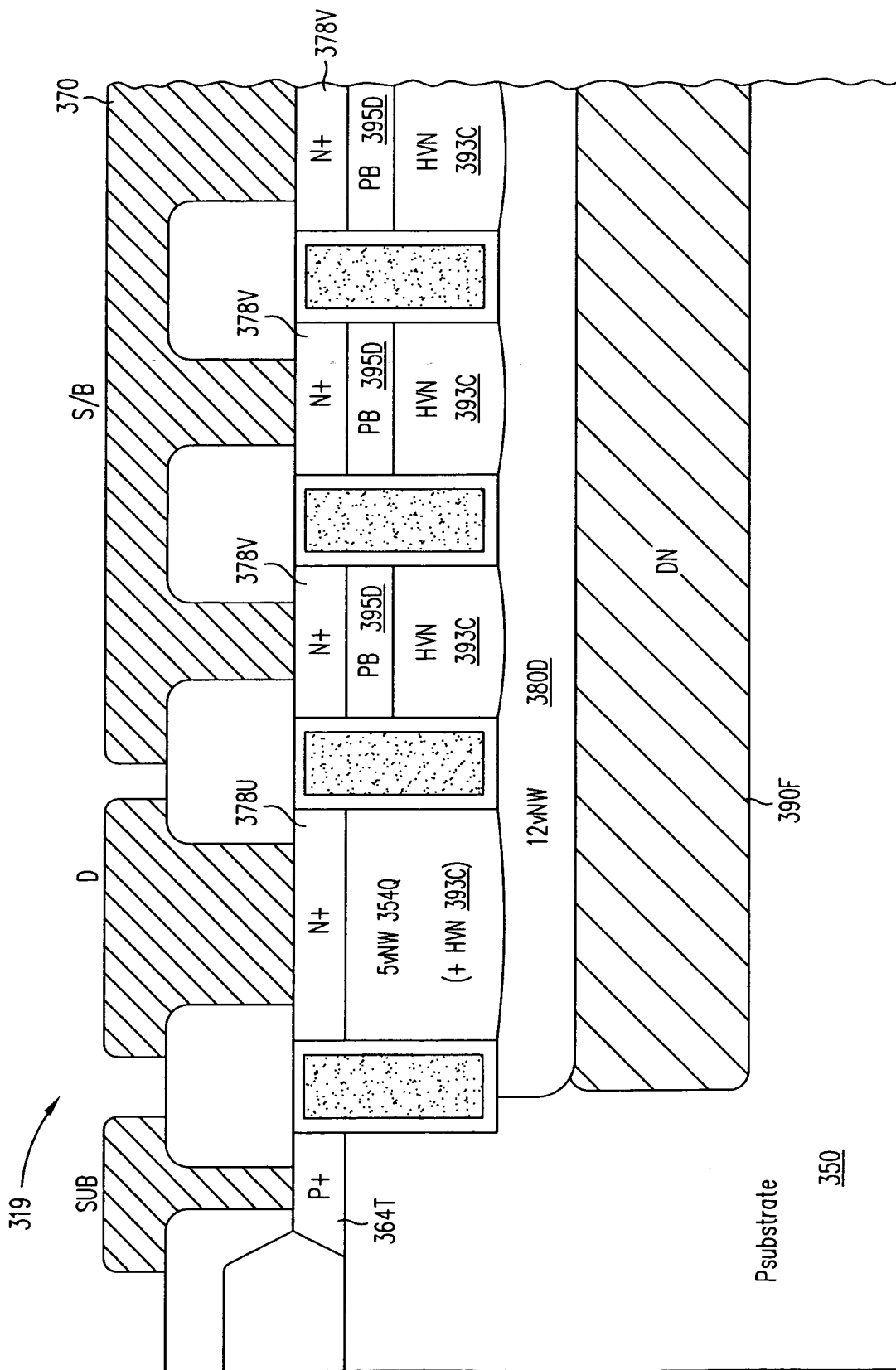


FIG. 18F

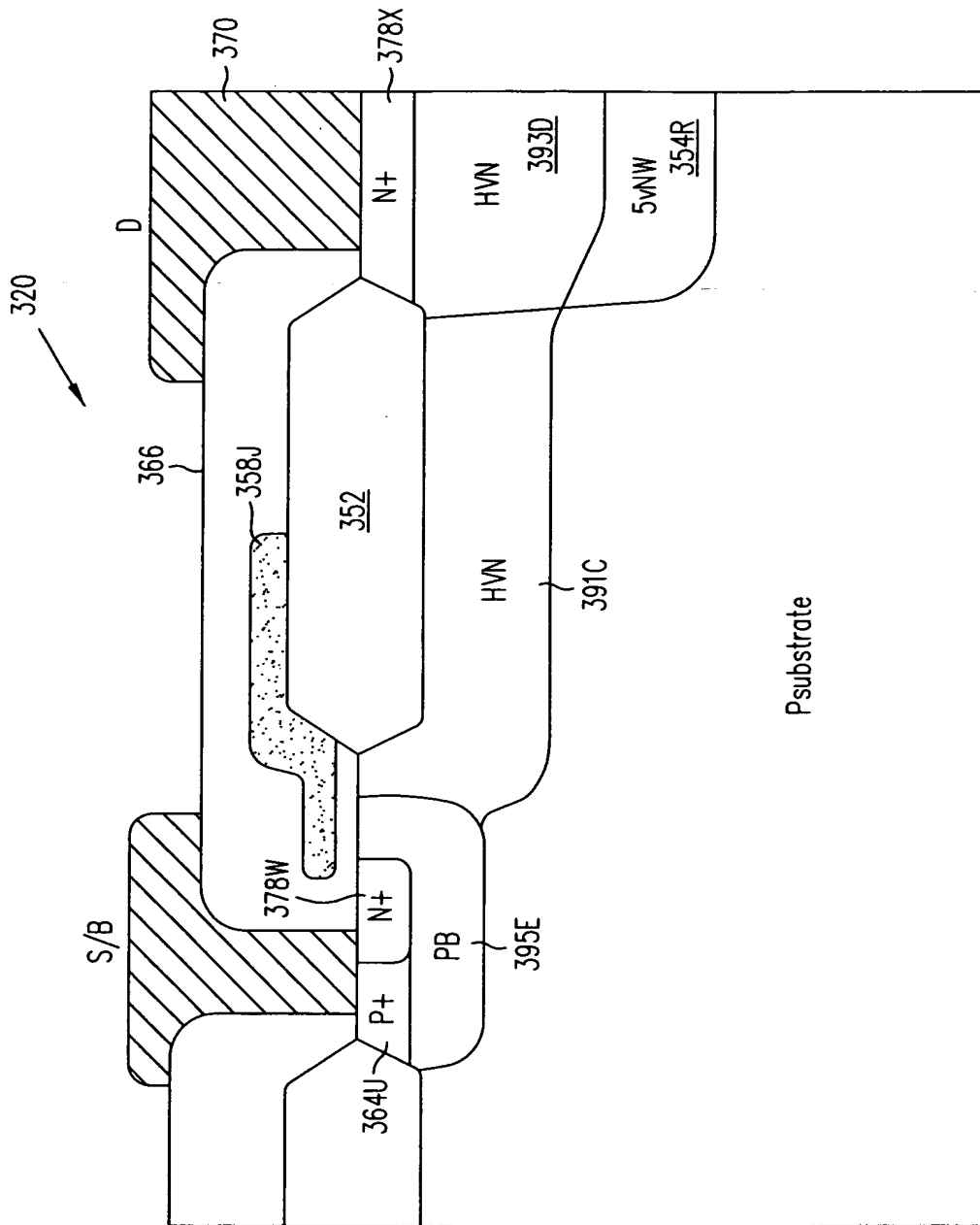


FIG. 18C

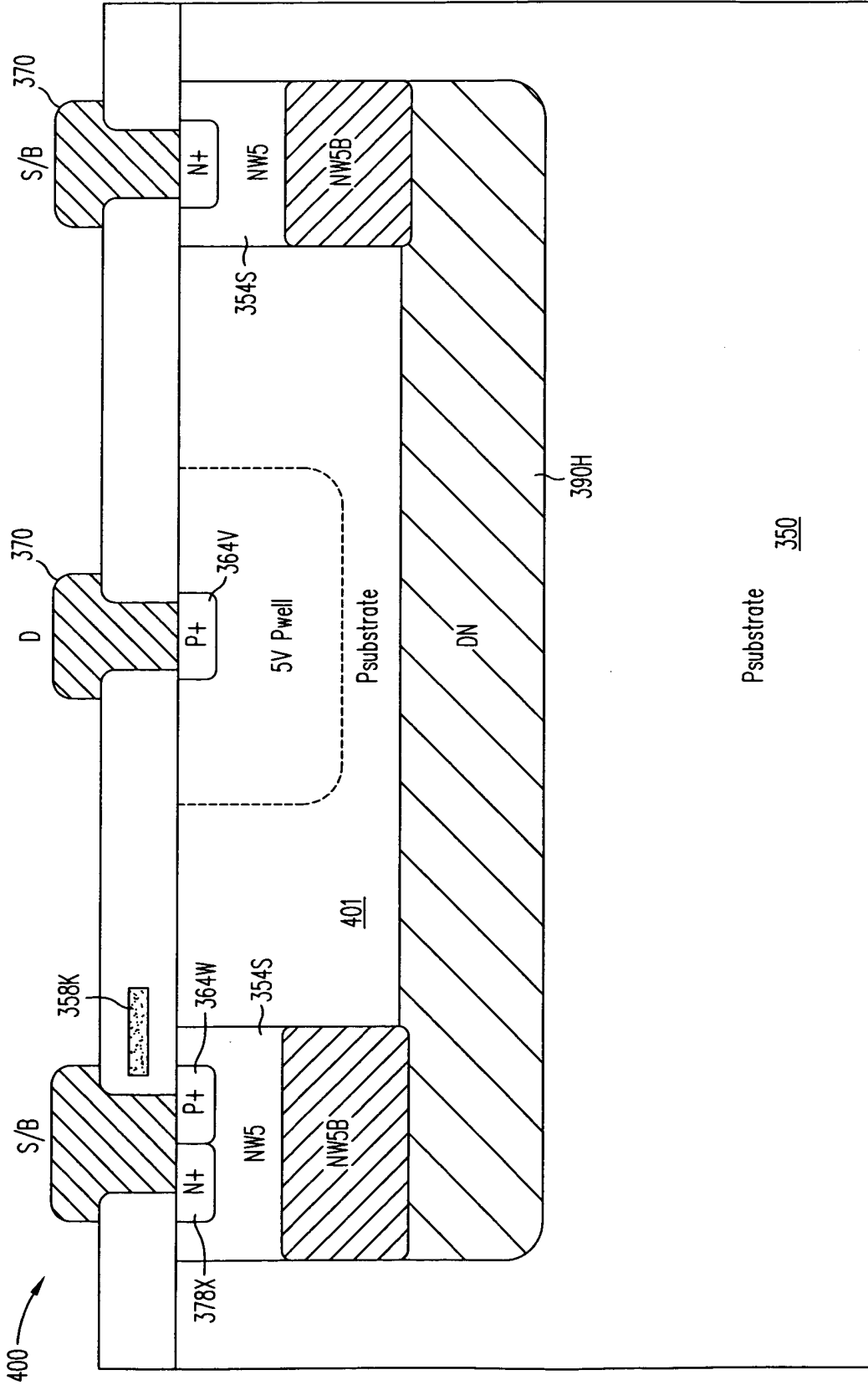


FIG. 18H

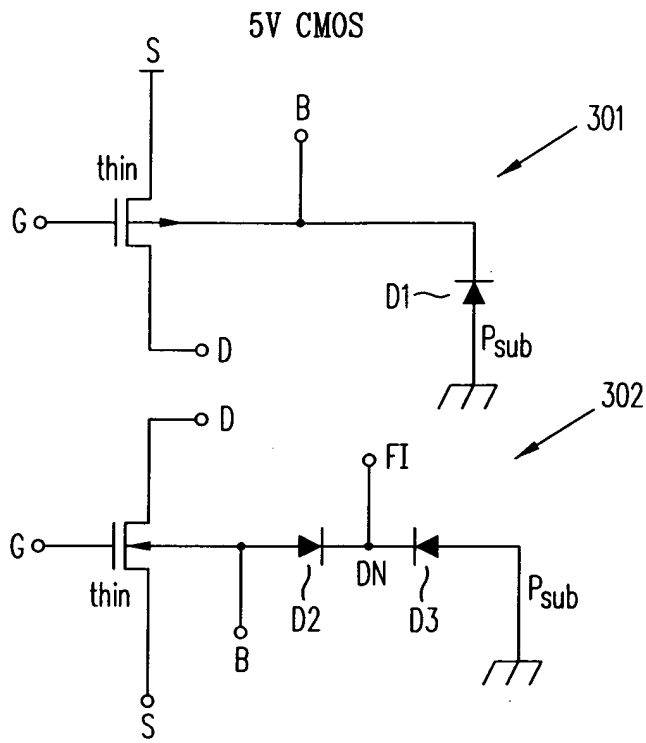


FIG. 19A

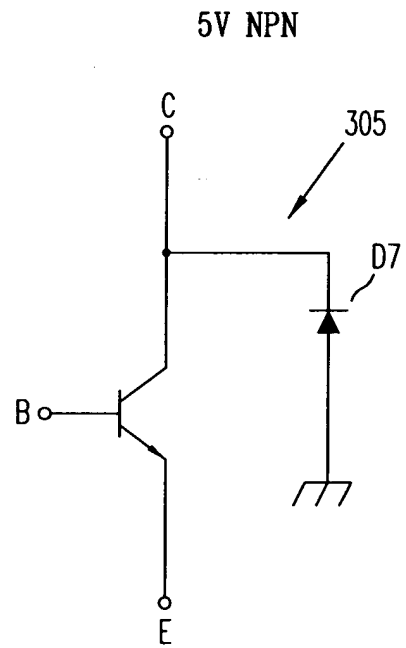


FIG. 19C

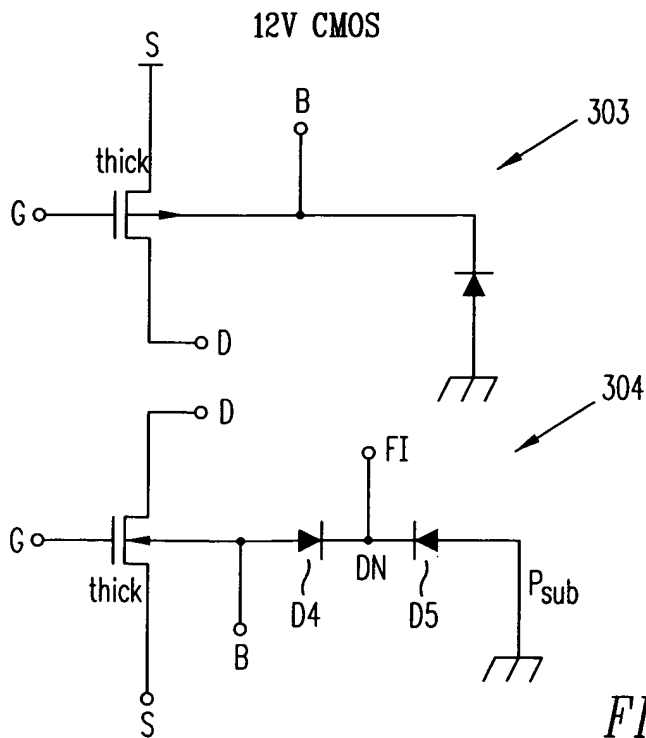


FIG. 19B

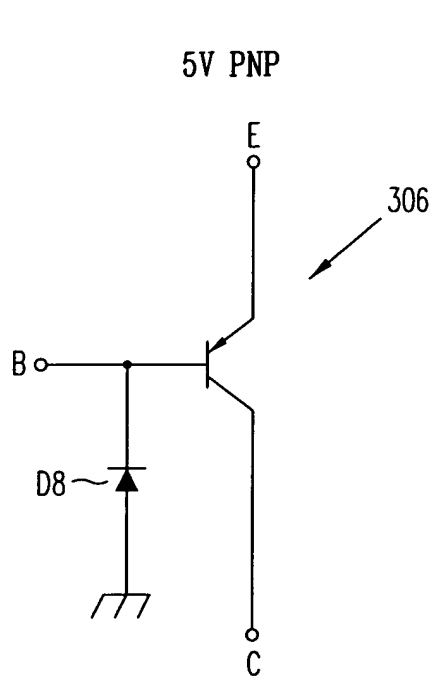


FIG. 19D

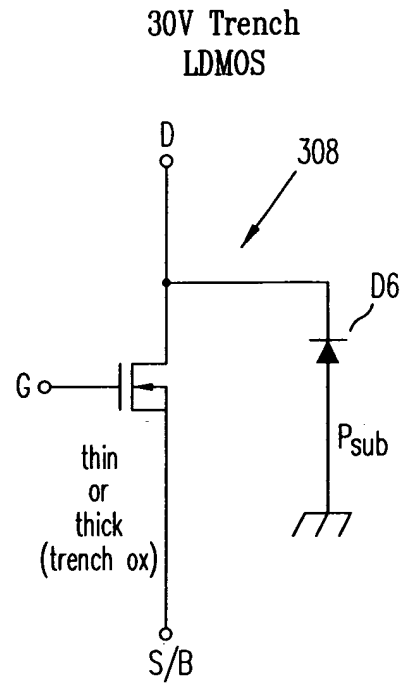


FIG. 19E

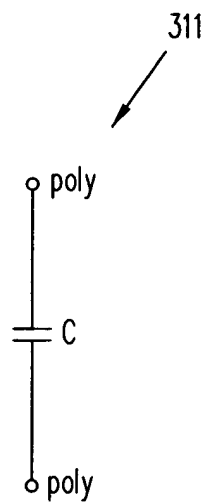


FIG. 19F

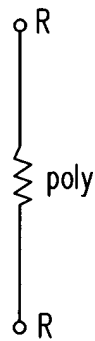


FIG. 19G

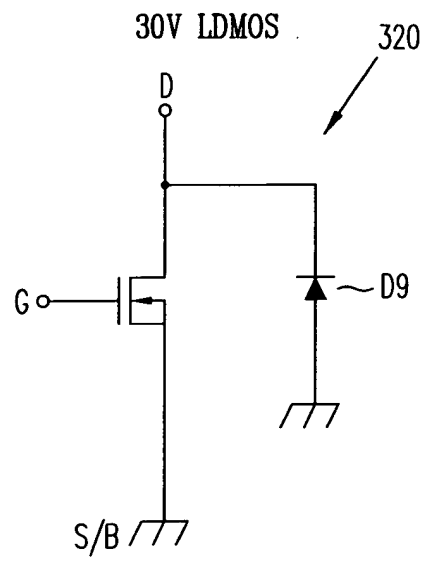


FIG. 19H

LOCOS Formation

Formation

- Sac Ox Strip
- Sac Ox
- Pad Ox Strip
- Pad Poly Strip
- Si N Strip
- Field Ox
- Active Mask
- Si N CVD
- Poly Pad CVD
- Pad Ox

Mesa Ox Strip
Etch Block Mask
Poly 1B Etch
Poly 1B Implant
Poly 1 Mask
3 Dep/Ox

PBody Implant
PBody Mask
HVN Implant
HVN Mask
Poly CMP

Poly CMP
Etchback Poly
Poly 1A Dep
Gate Ox 1
c Ox Strip

Sac Ox Strip

Sac Ox

Trench Etch

Hardmask Etch

Trench Mask

Ox CVD

Si N Dep

Pad Ox

A diagram showing a cross-section of a semiconductor structure. It consists of a thin rectangular layer on top of a larger rectangular block. The top layer is labeled "P-epi" and the bottom block is labeled "P- substrate".

Diagram illustrating the first seven steps of the Poly 1B process:

- Poly 1B Dep
- Poly 1B Ox
- Si N CVD
- Healing Ox
- Poly 1B Implant
- Poly 1B Mask
- Poly 1B Etch

Poly Cap Formation

To
FIG. 20B

FIG. 20A

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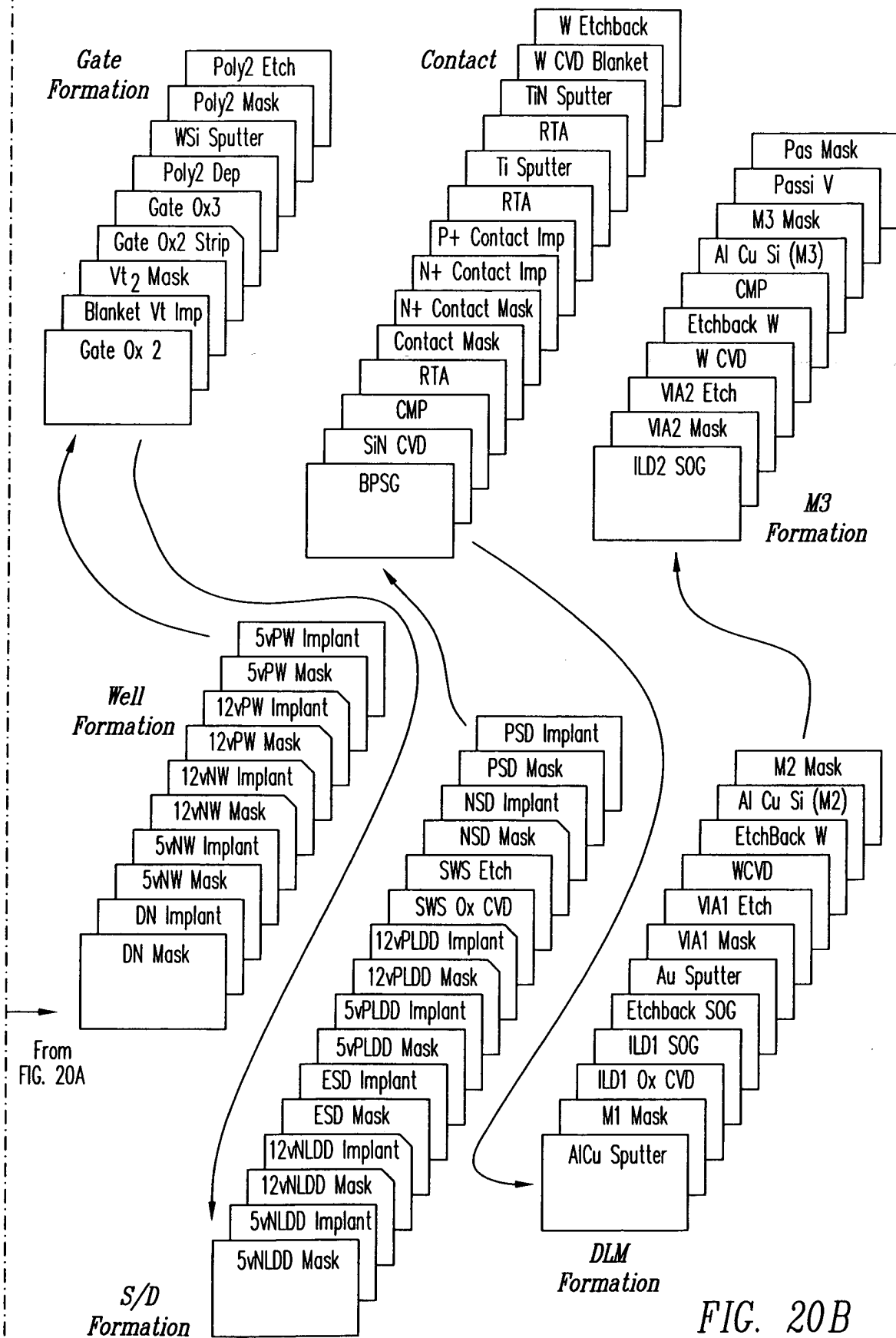


FIG. 20B

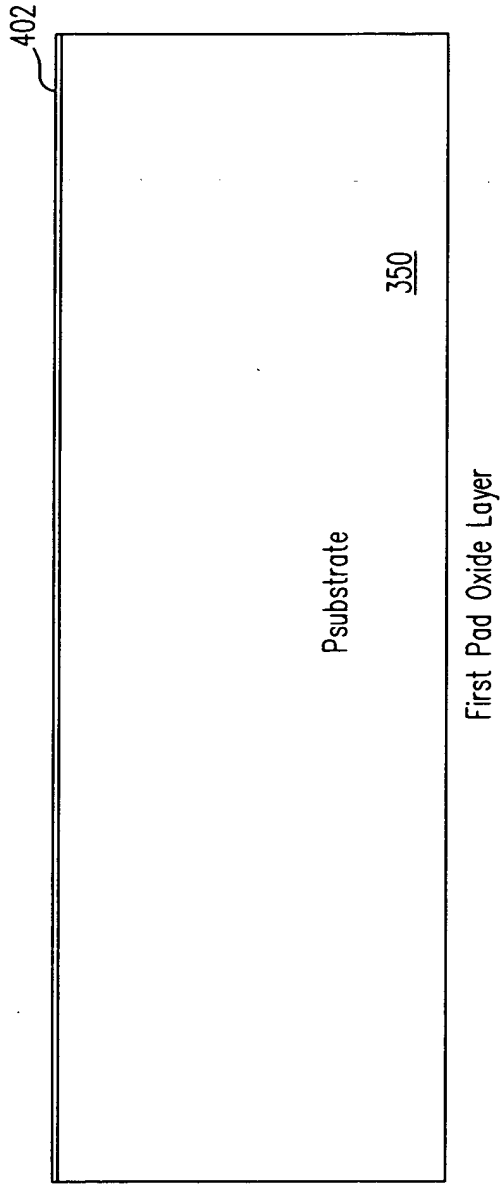


FIG. 21

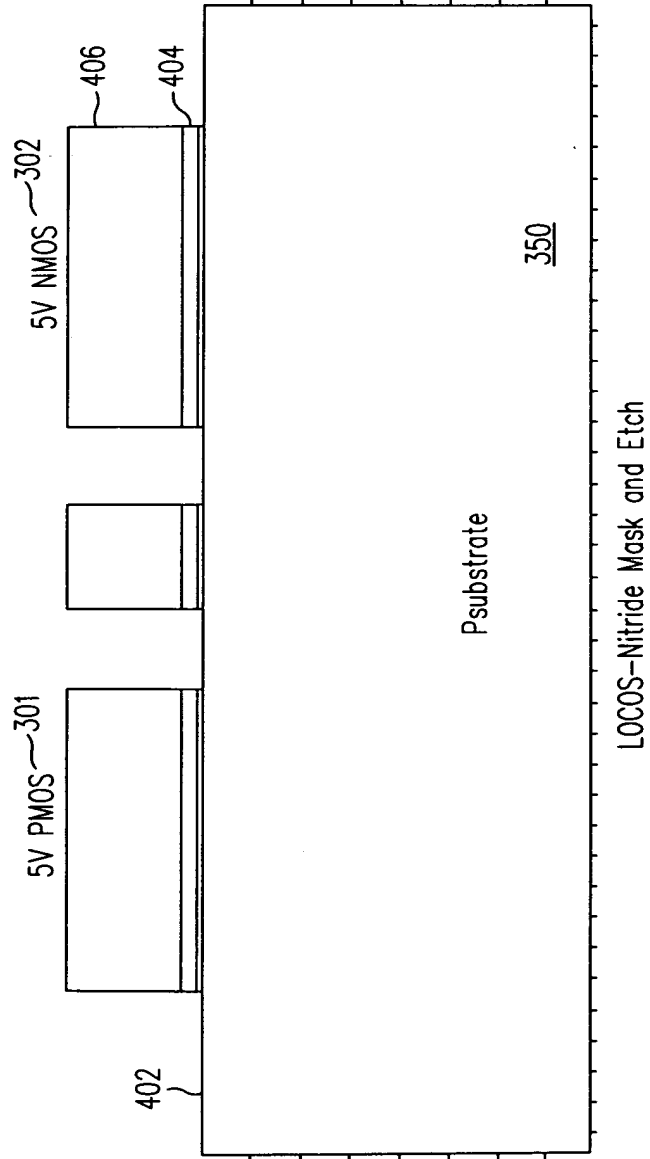


FIG. 22A

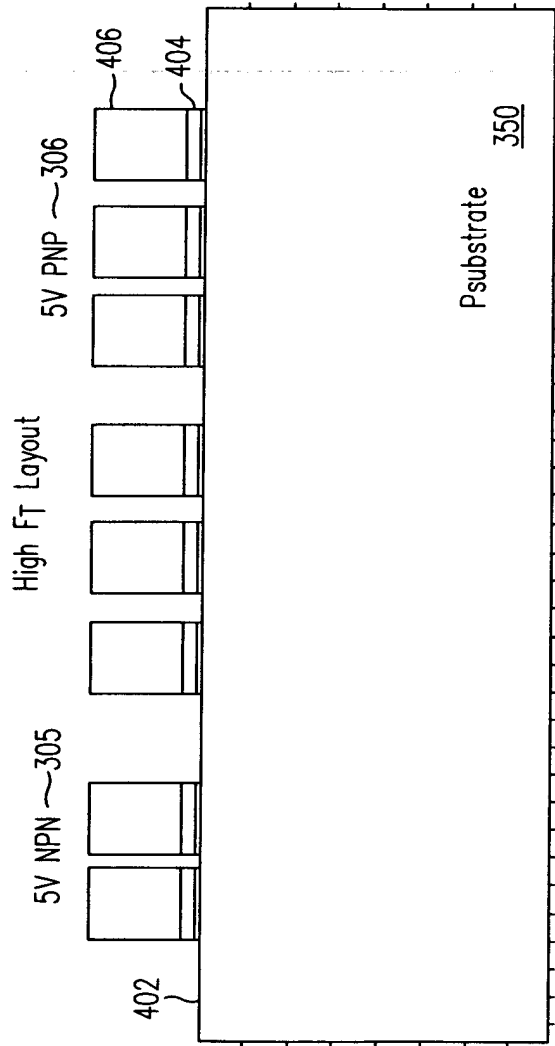


FIG. 22B

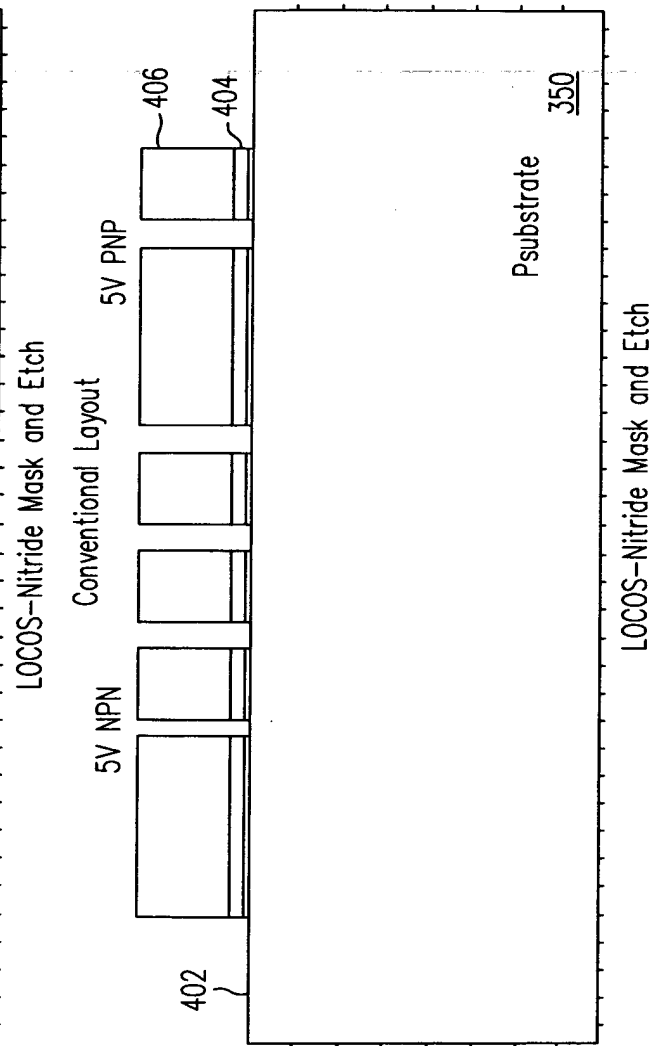
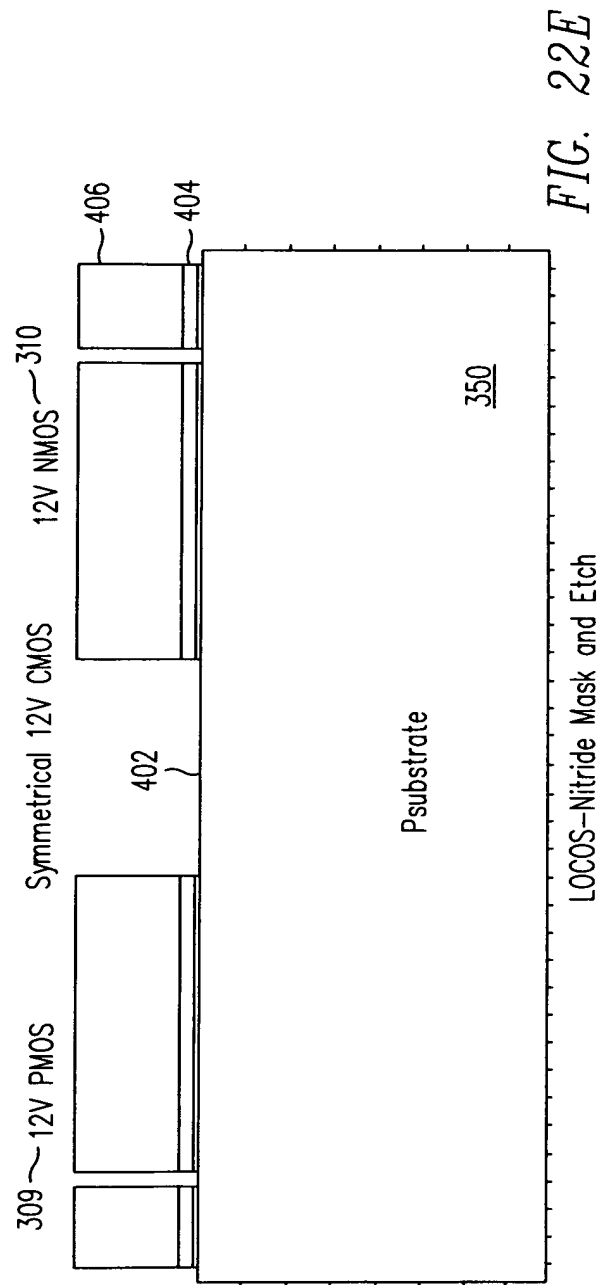
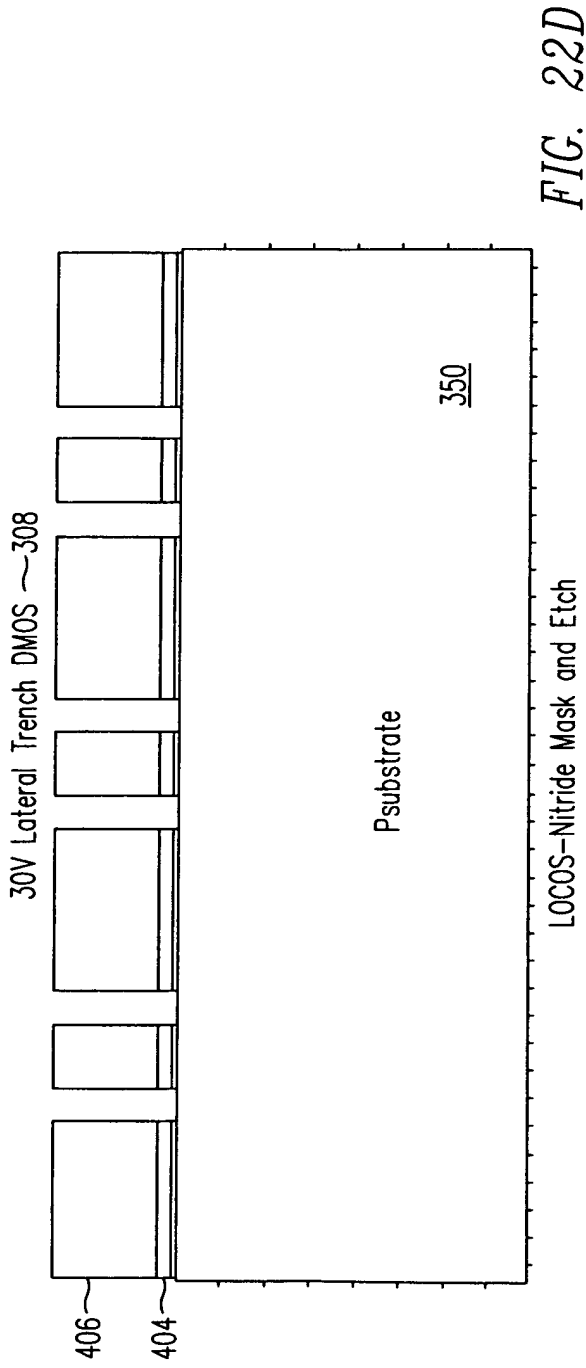


FIG. 22C



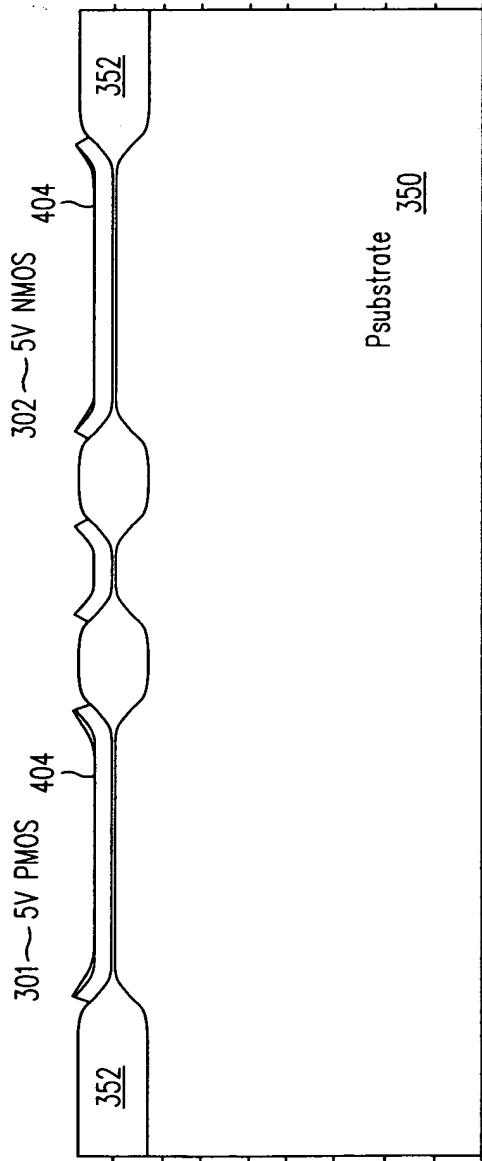


FIG. 23A

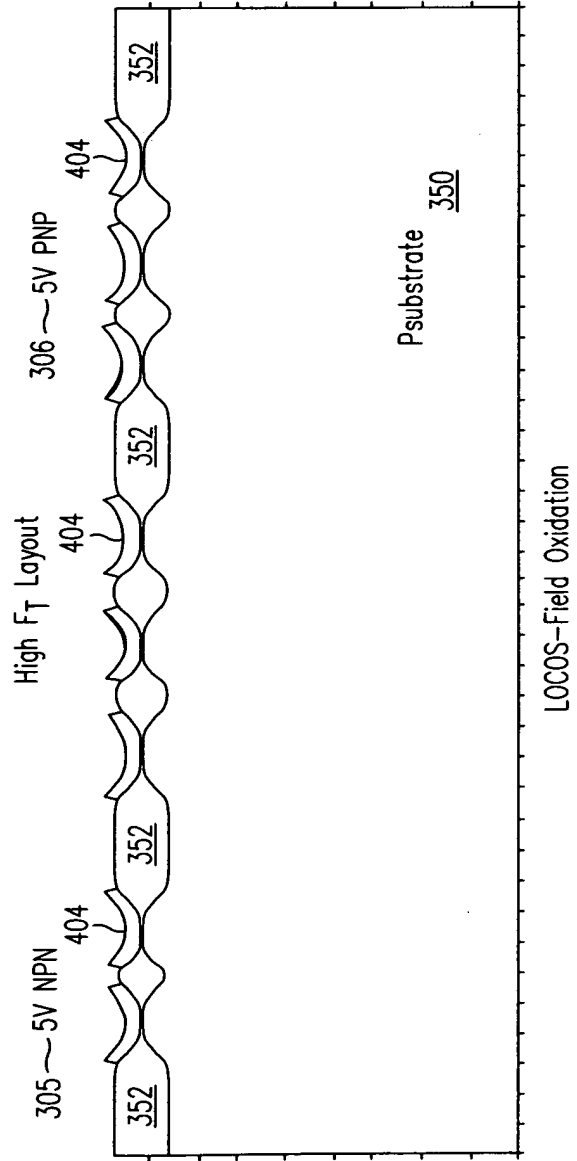


FIG. 23B

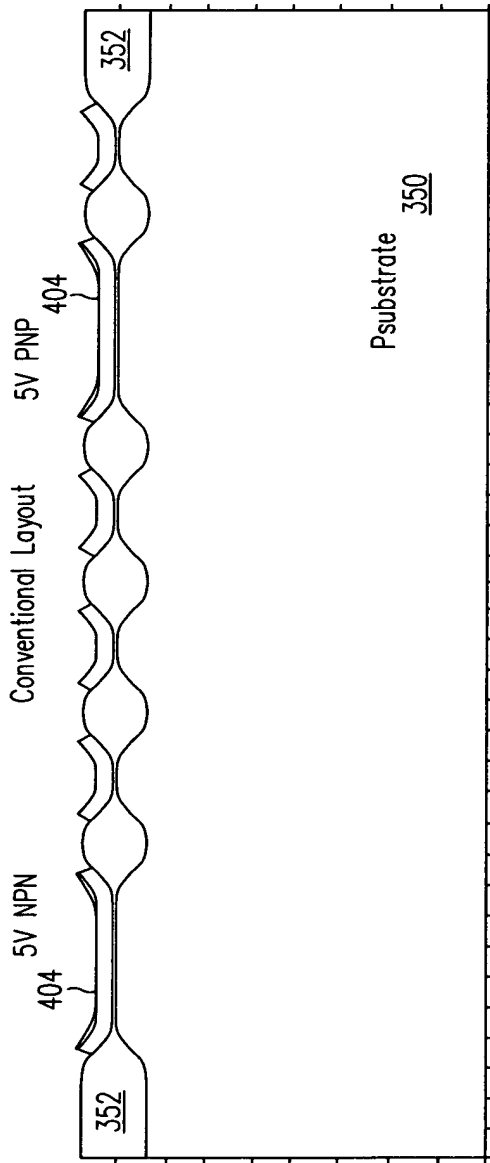


FIG. 23C

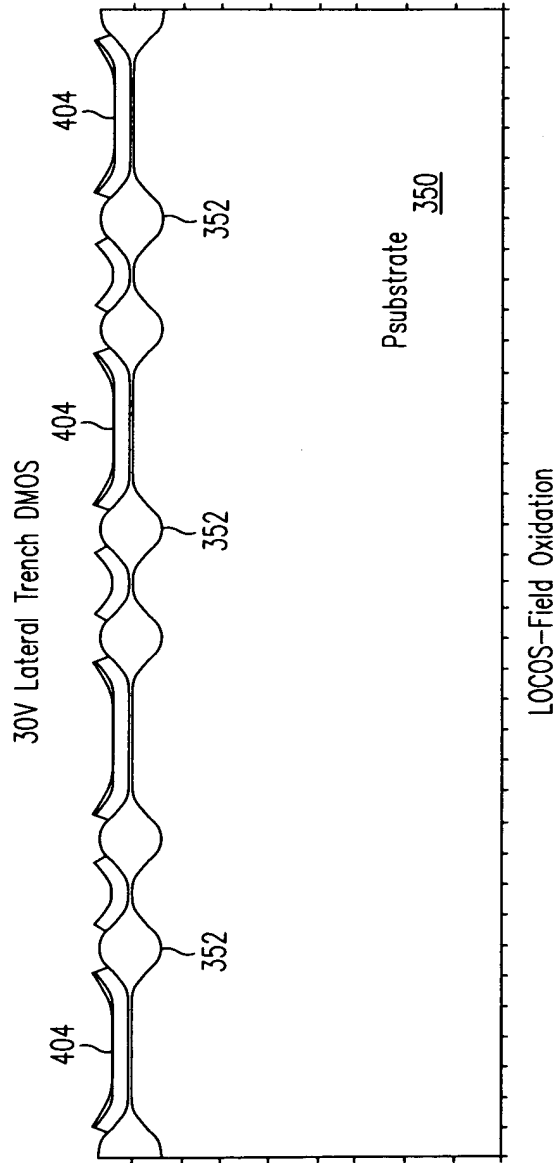


FIG. 23D

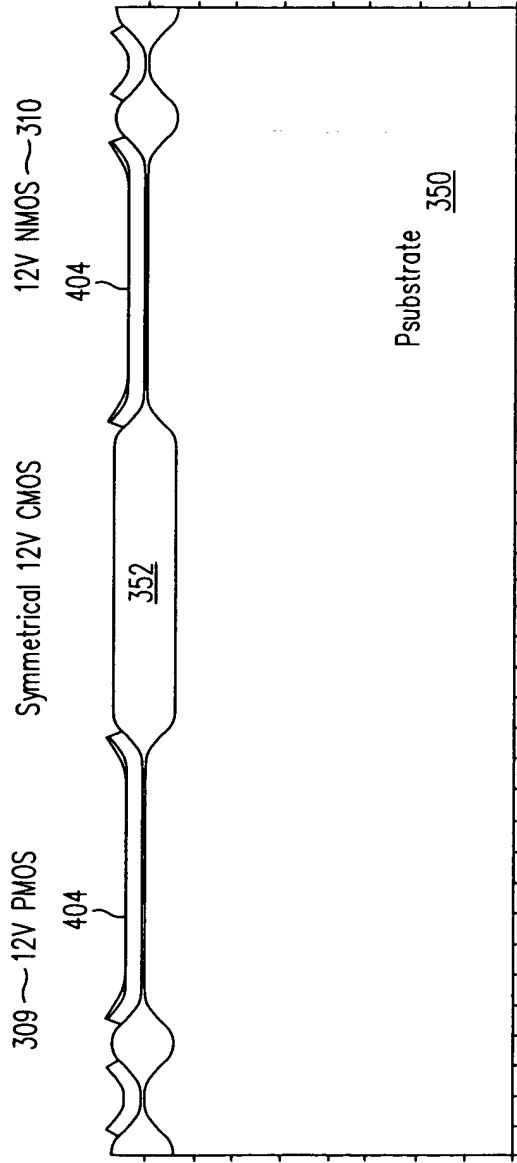


FIG. 23E

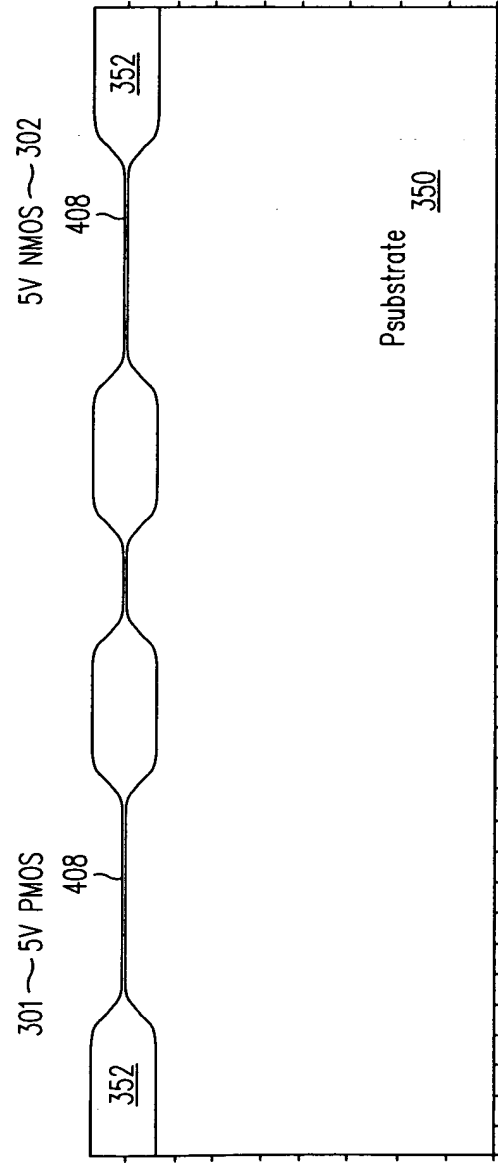


FIG. 24A

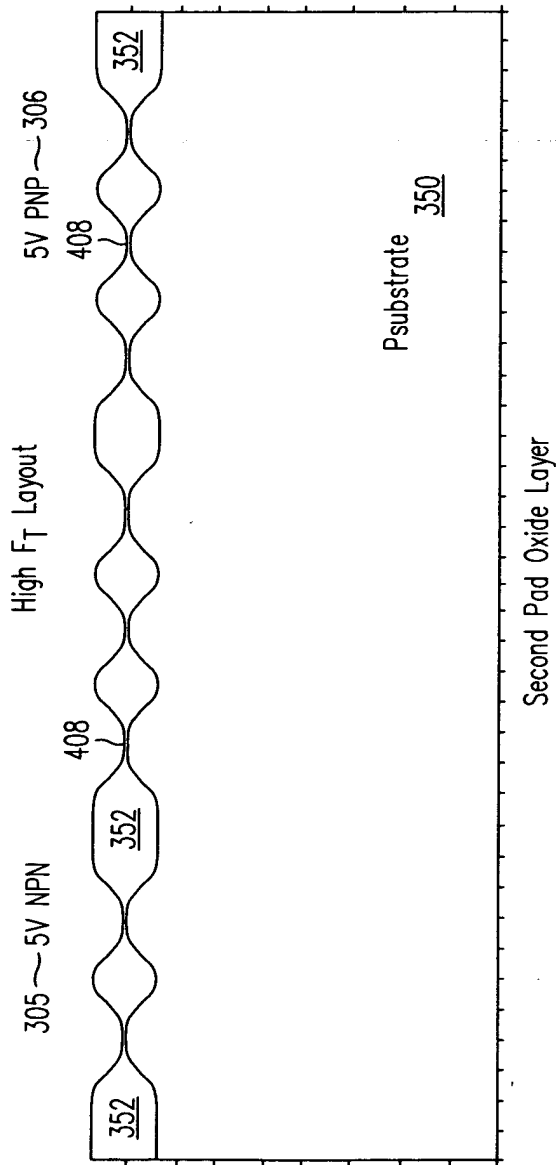


FIG. 24B

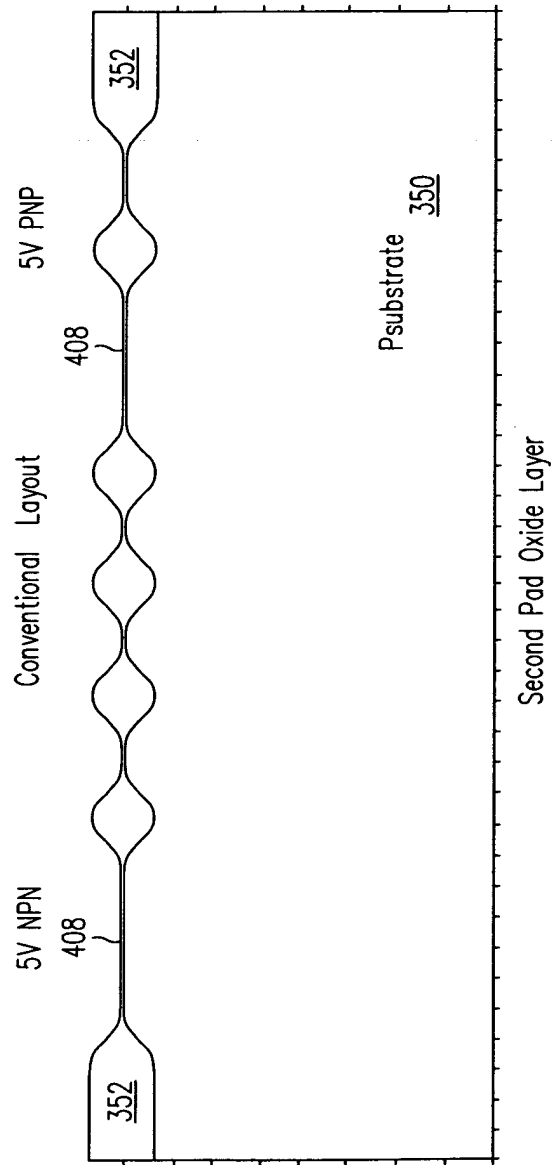
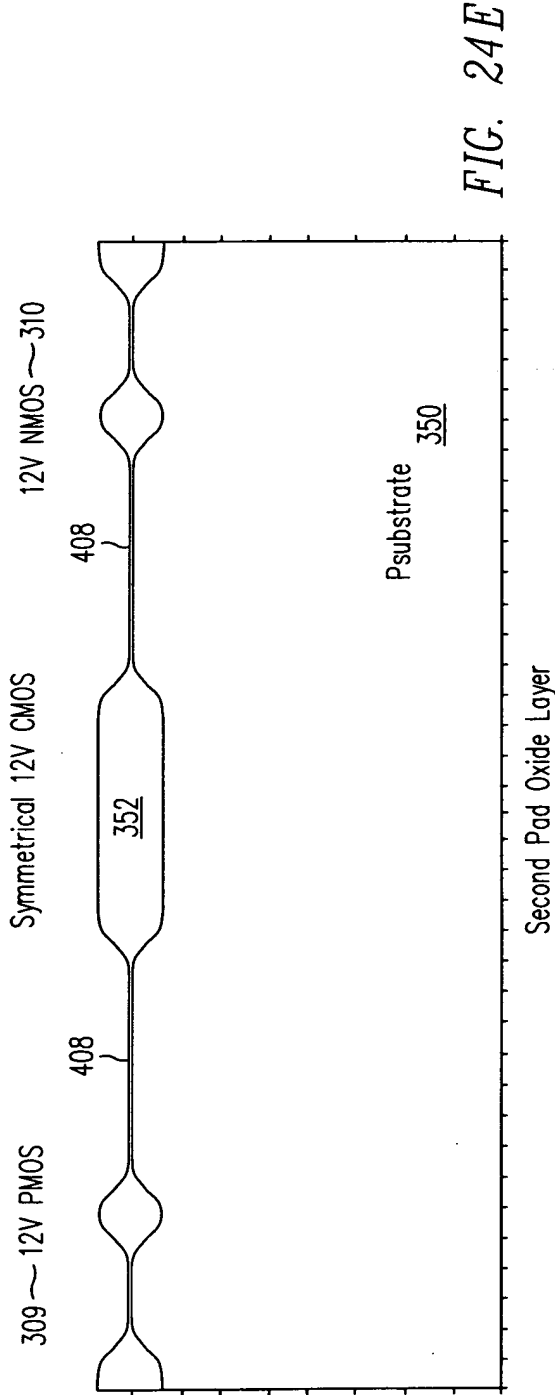
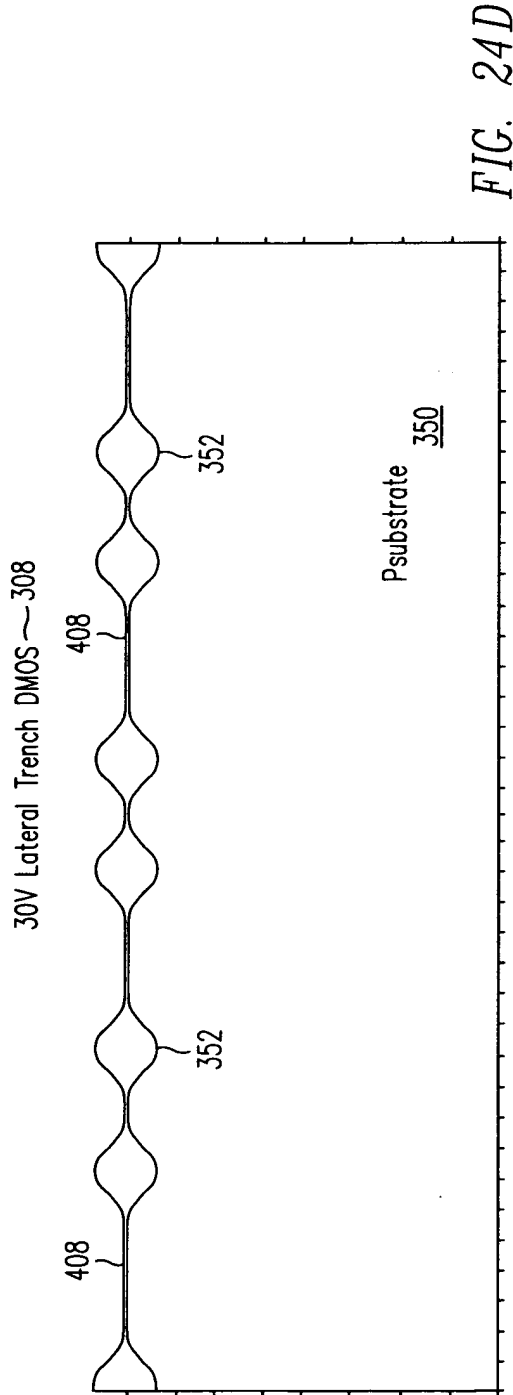
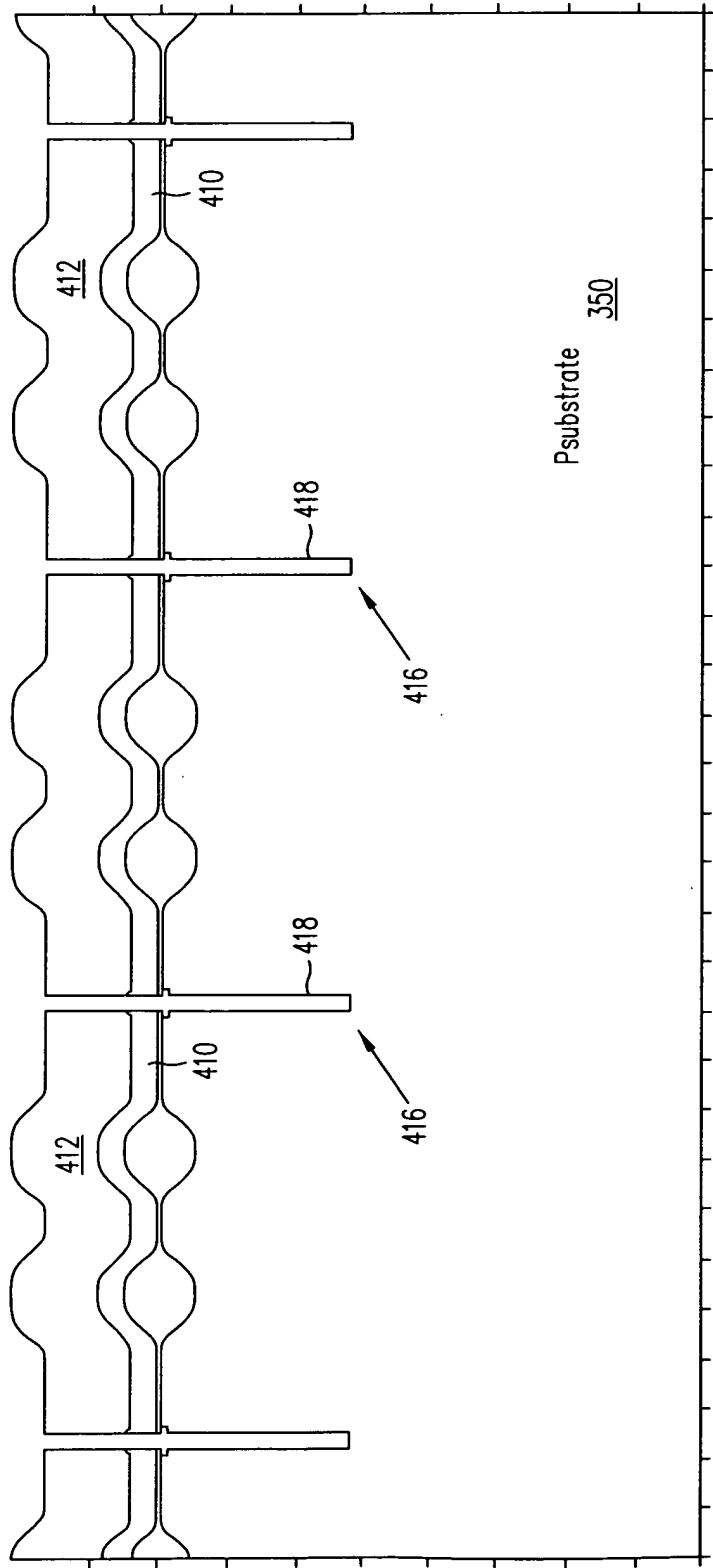


FIG. 24C



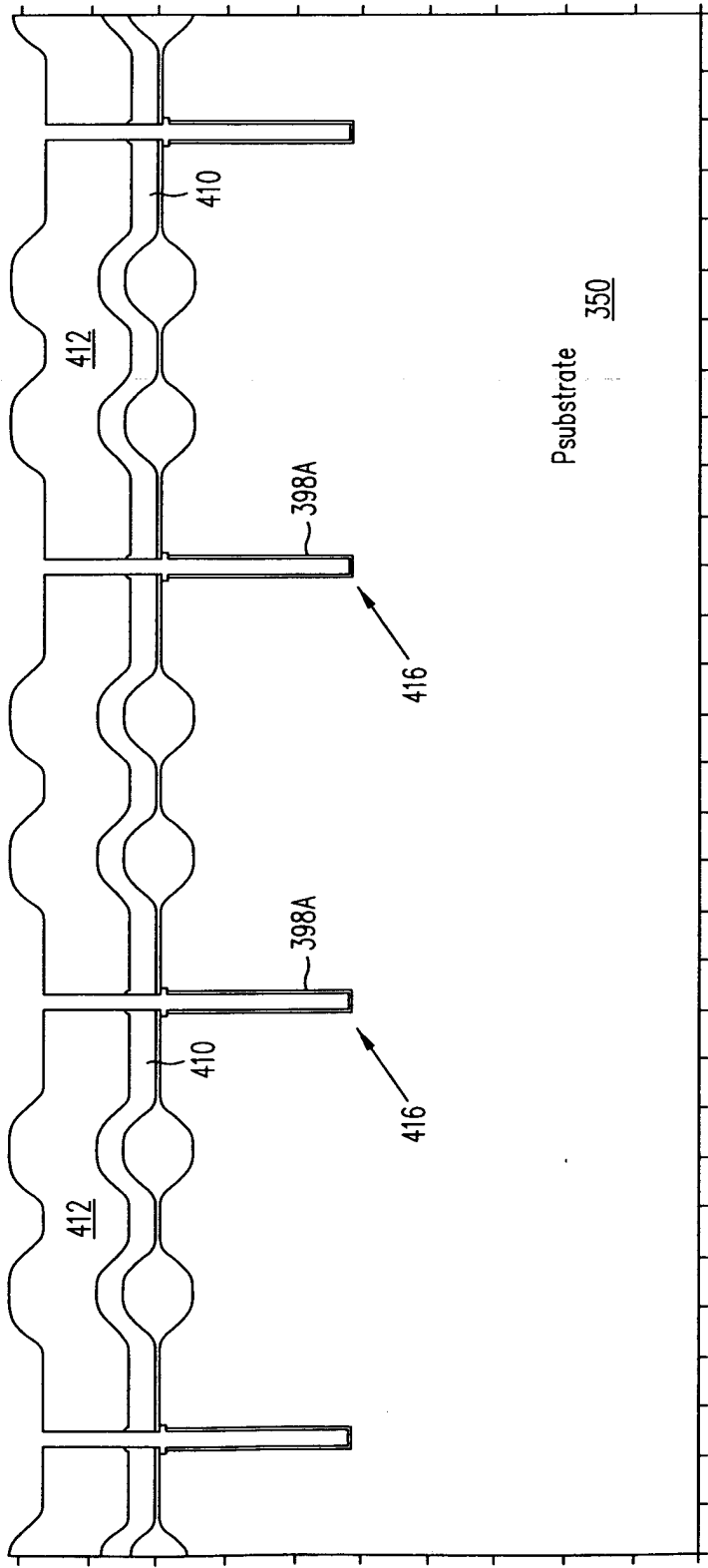
30V Lateral Trench DMOS ~ 308



Sacrificial Oxide

FIG. 26D

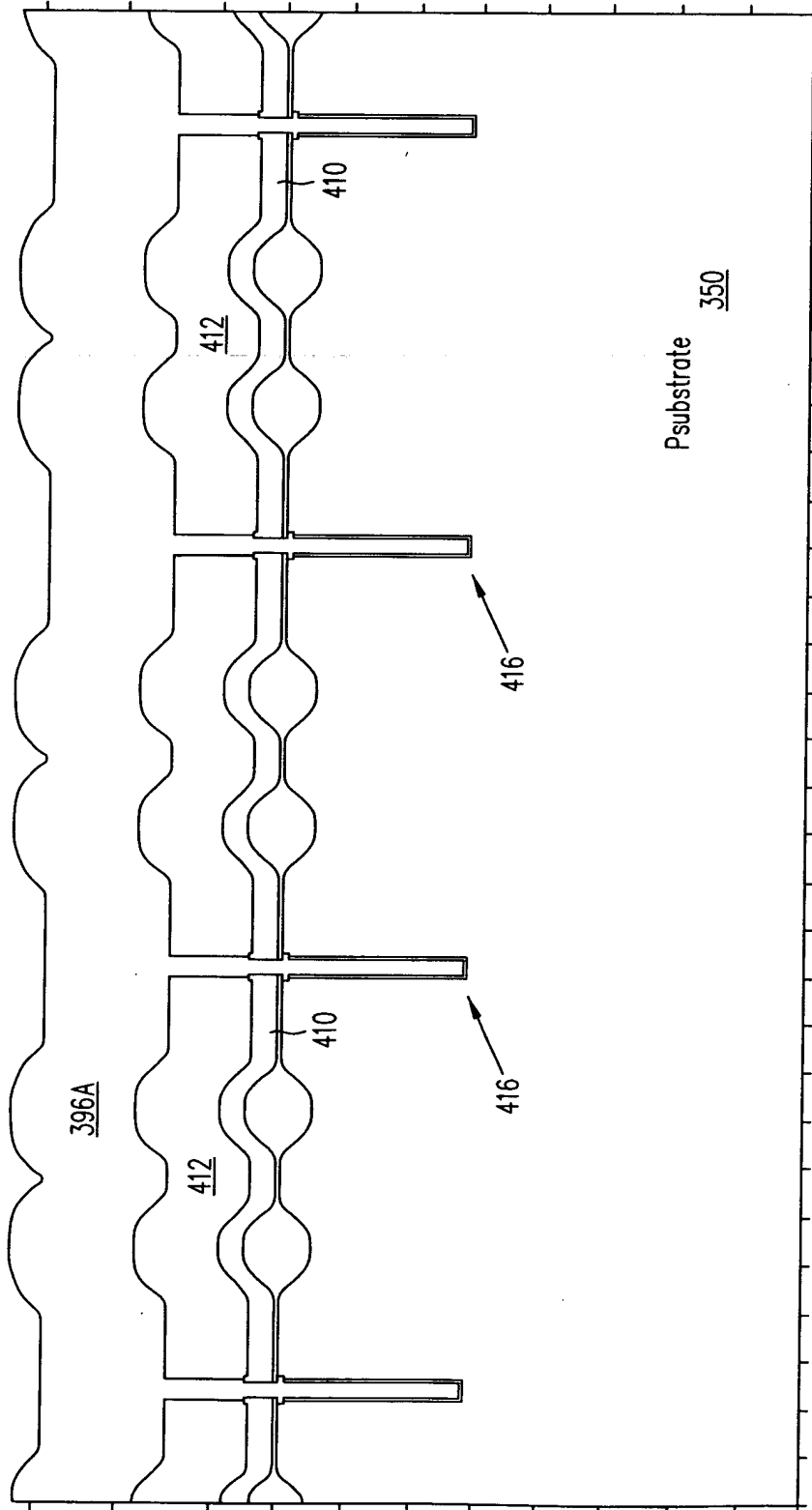
30V Lateral Trench DMOS ~ 308



Trench Gate Oxide

FIG. 27D

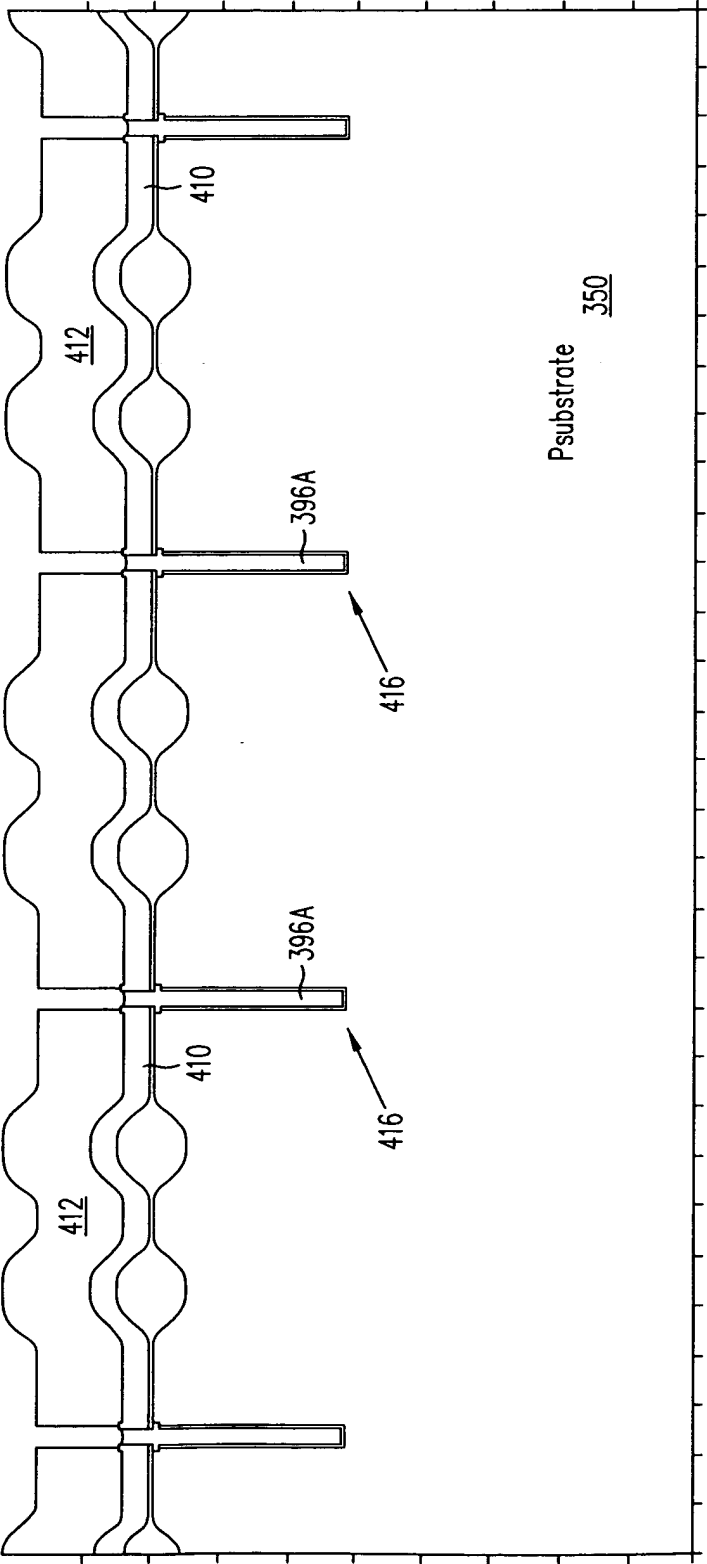
30V Lateral Trench DMOS ~308



Polysilicon-First Layer

FIG. 28D

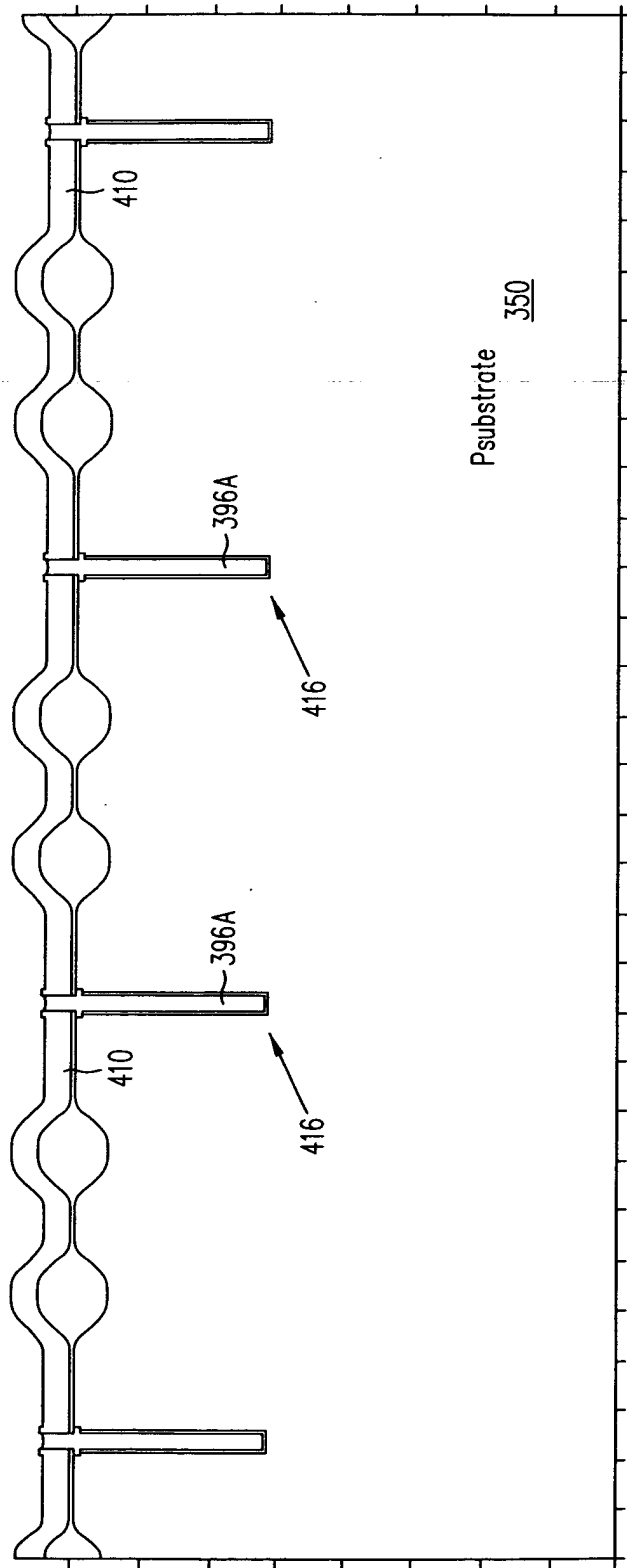
30V Lateral Trench DMOS ~ 308



Polysilicon Etchback—First Layer

FIG. 29D

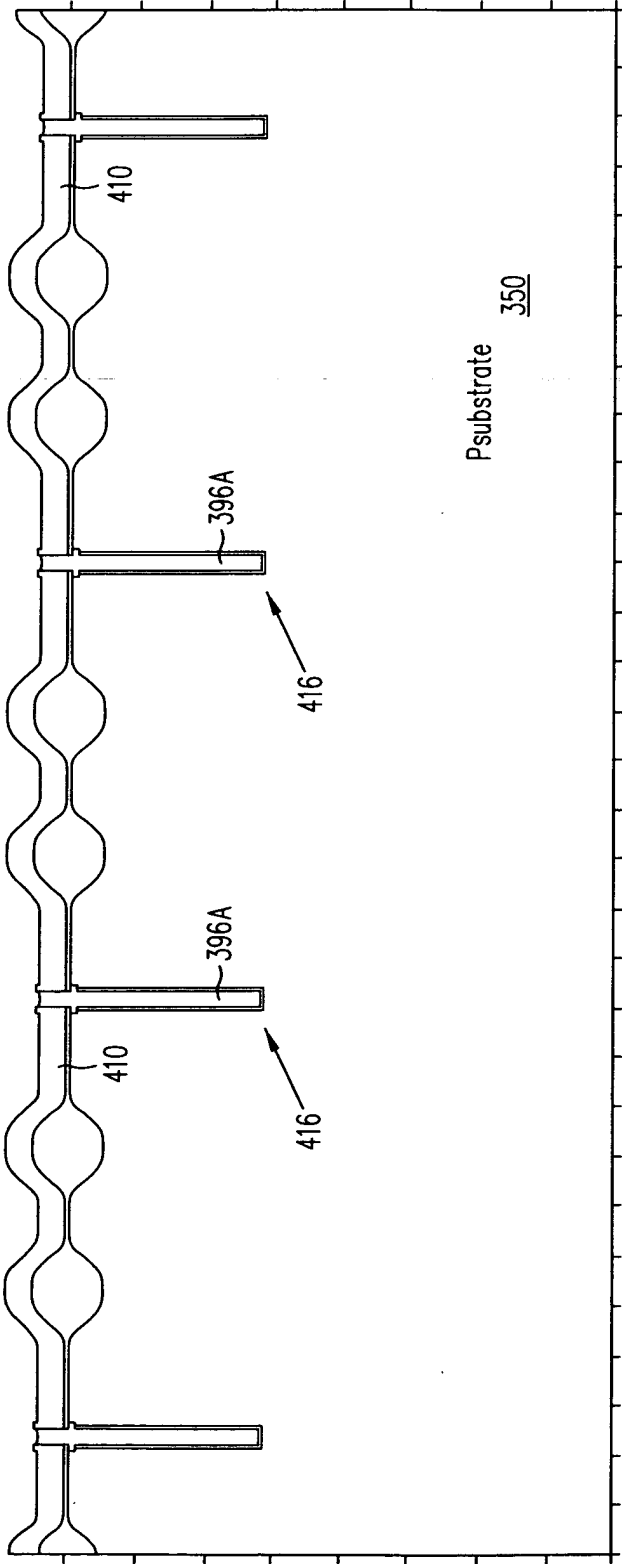
30V Lateral Trench DMOS ~ 308



Hard Mask Removal

FIG. 30D

30V Lateral Trench DMOS ~ 308



Second Polysilicon Etchback—First Layer

FIG. 31D

30V Lateral Trench DMOS ~ 308

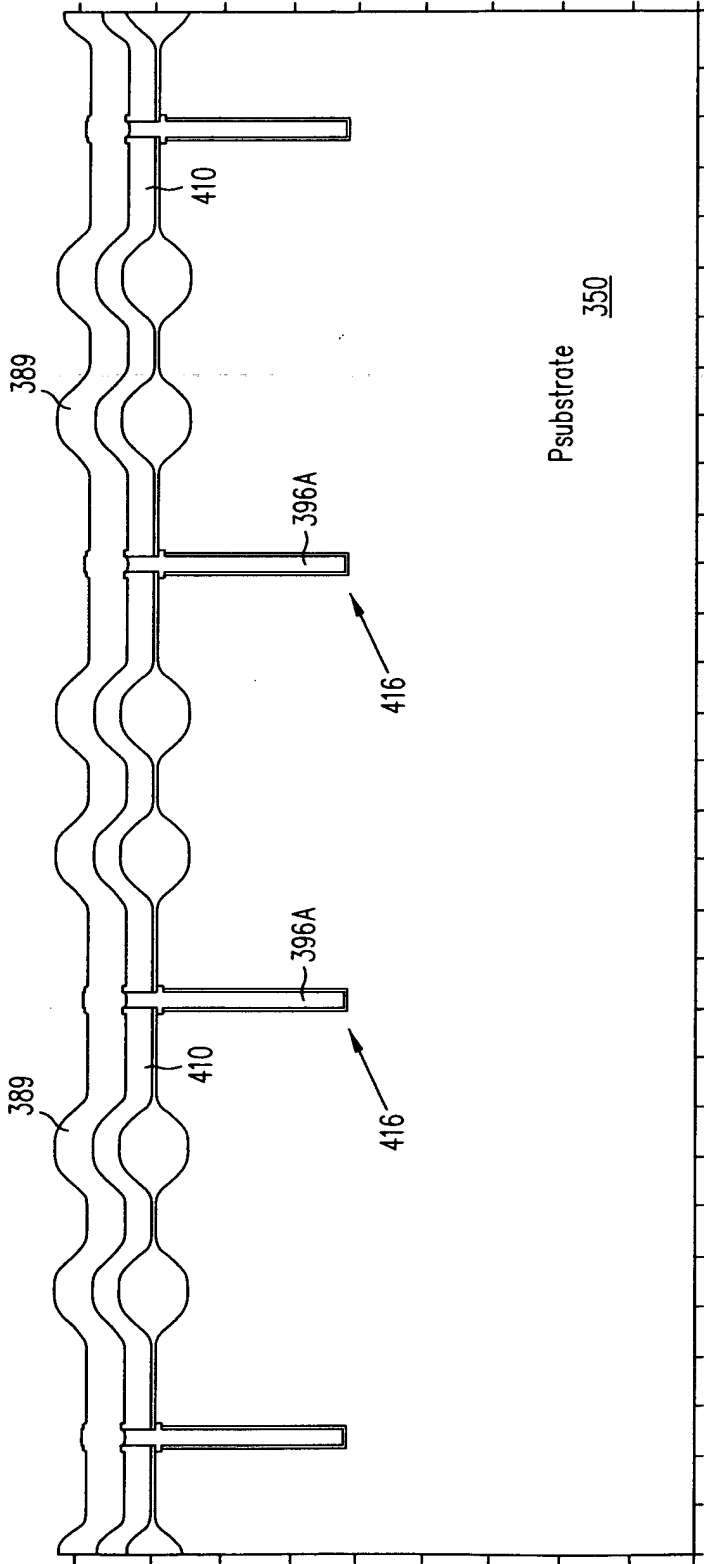
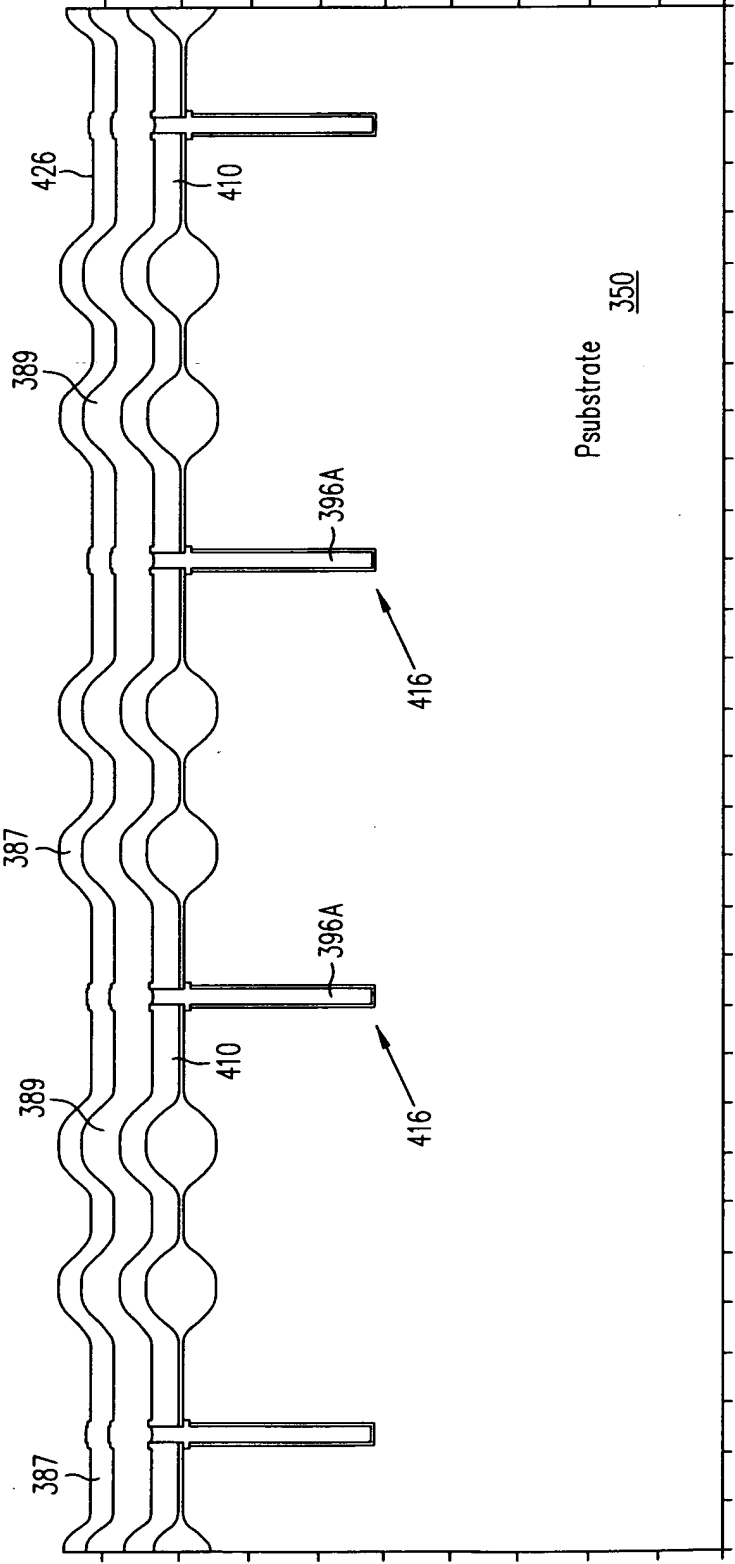


FIG. 32D

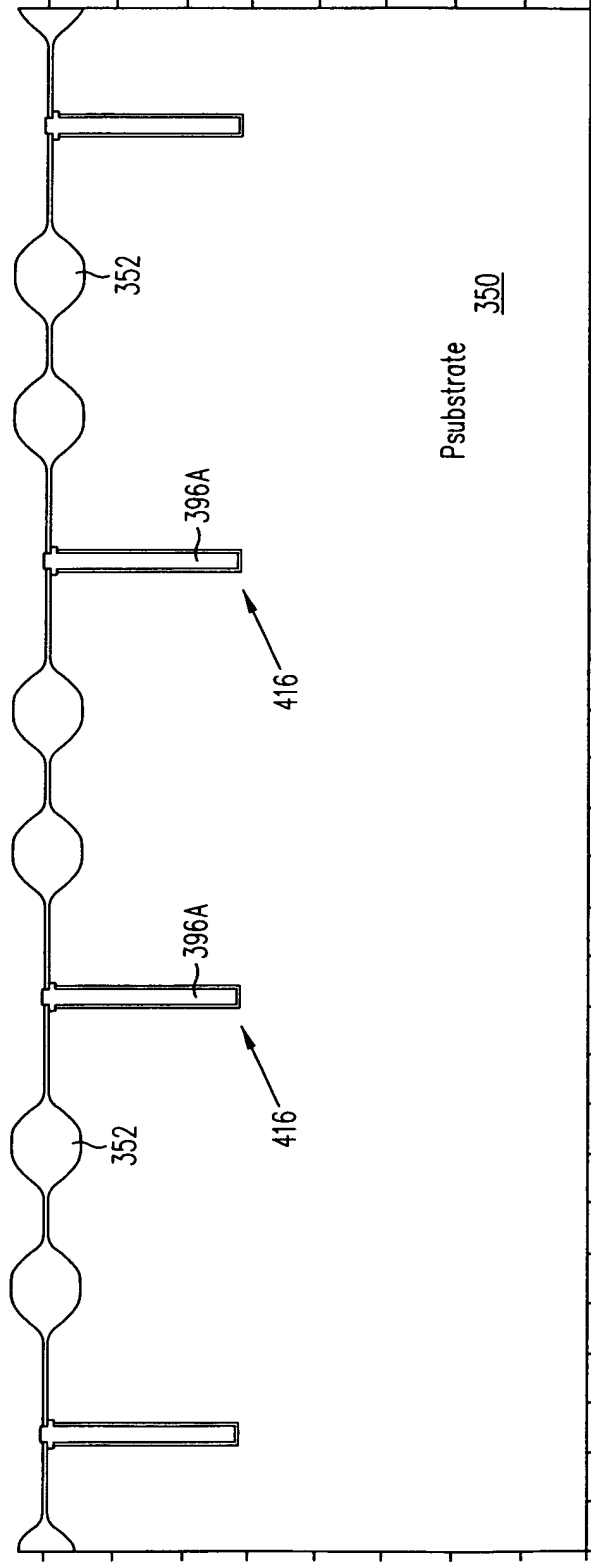
30V Lateral Trench DMOS ~308



Interlayer Dielectric

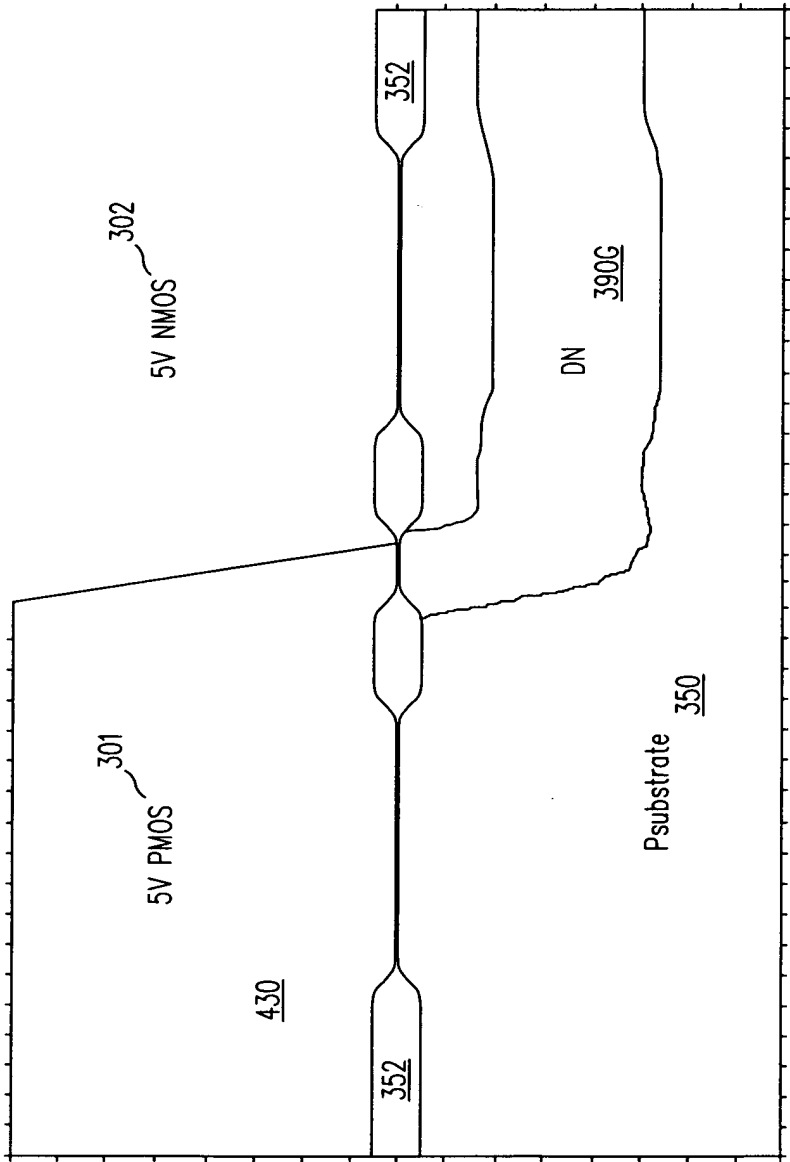
FIG. 33D

30V Lateral Trench DMOS ~ 308



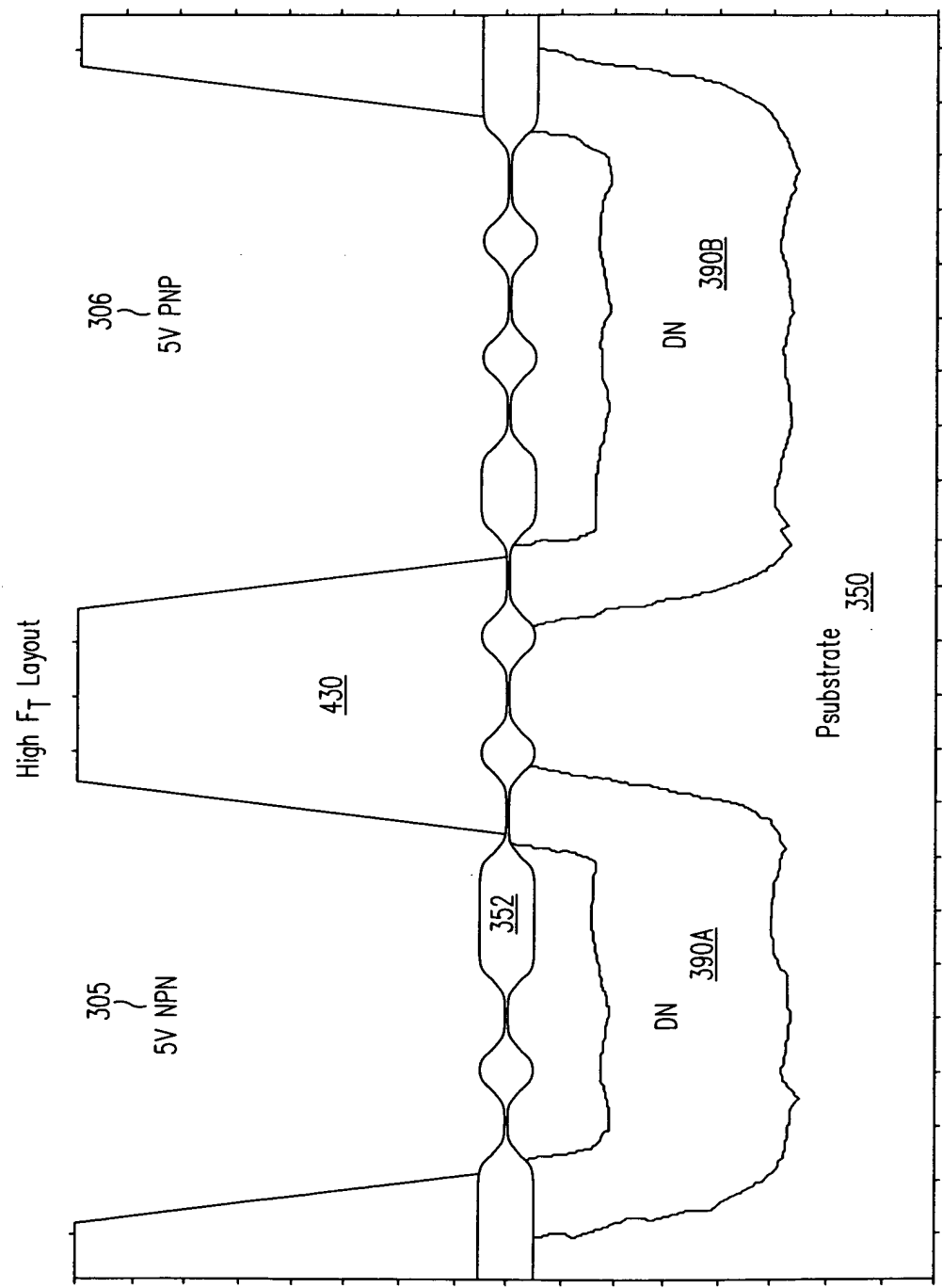
Etchback-Interlayer Dielectric and Second Poly

FIG. 34D



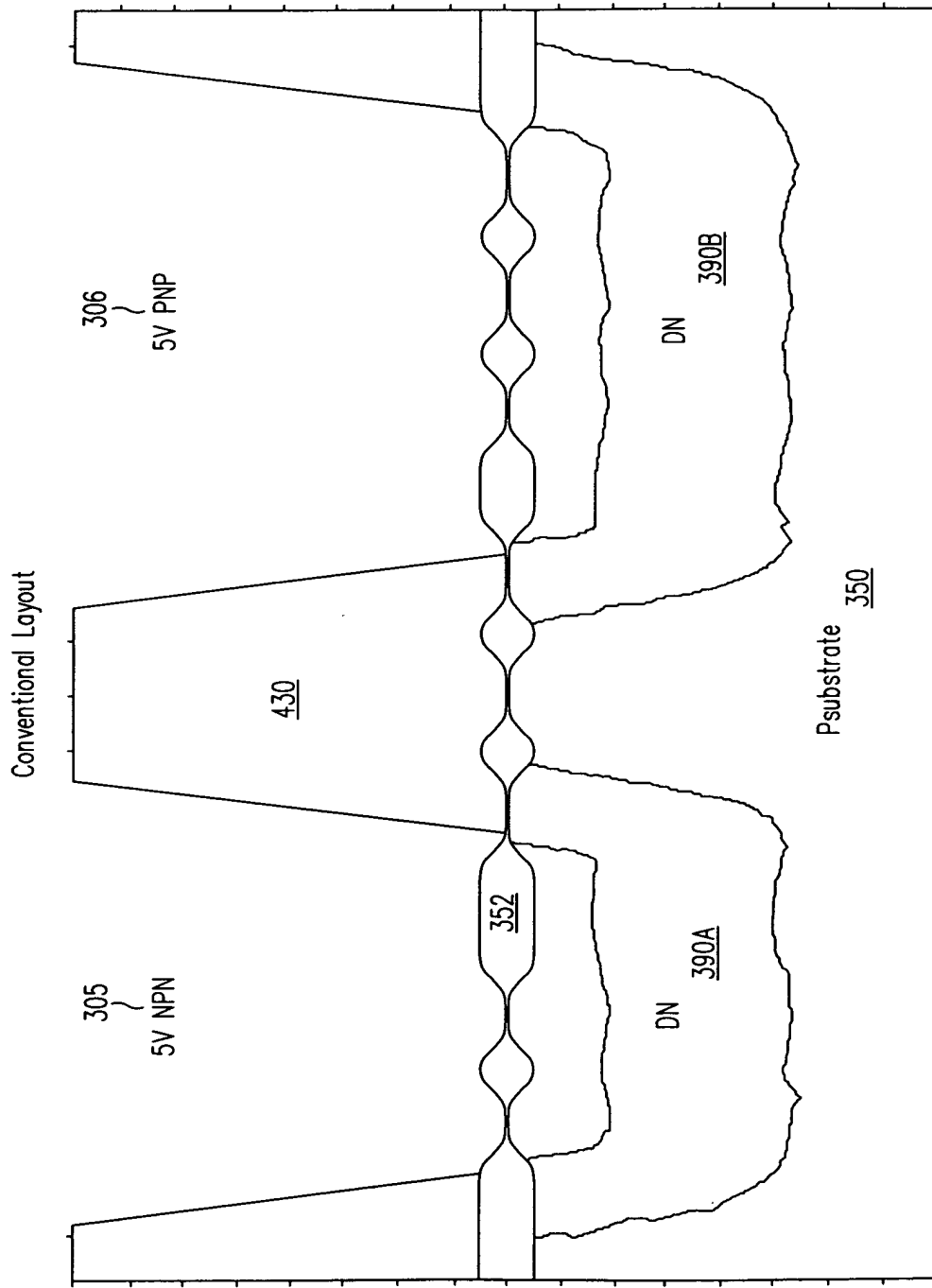
Deep N Mask and Implant

FIG. 35A



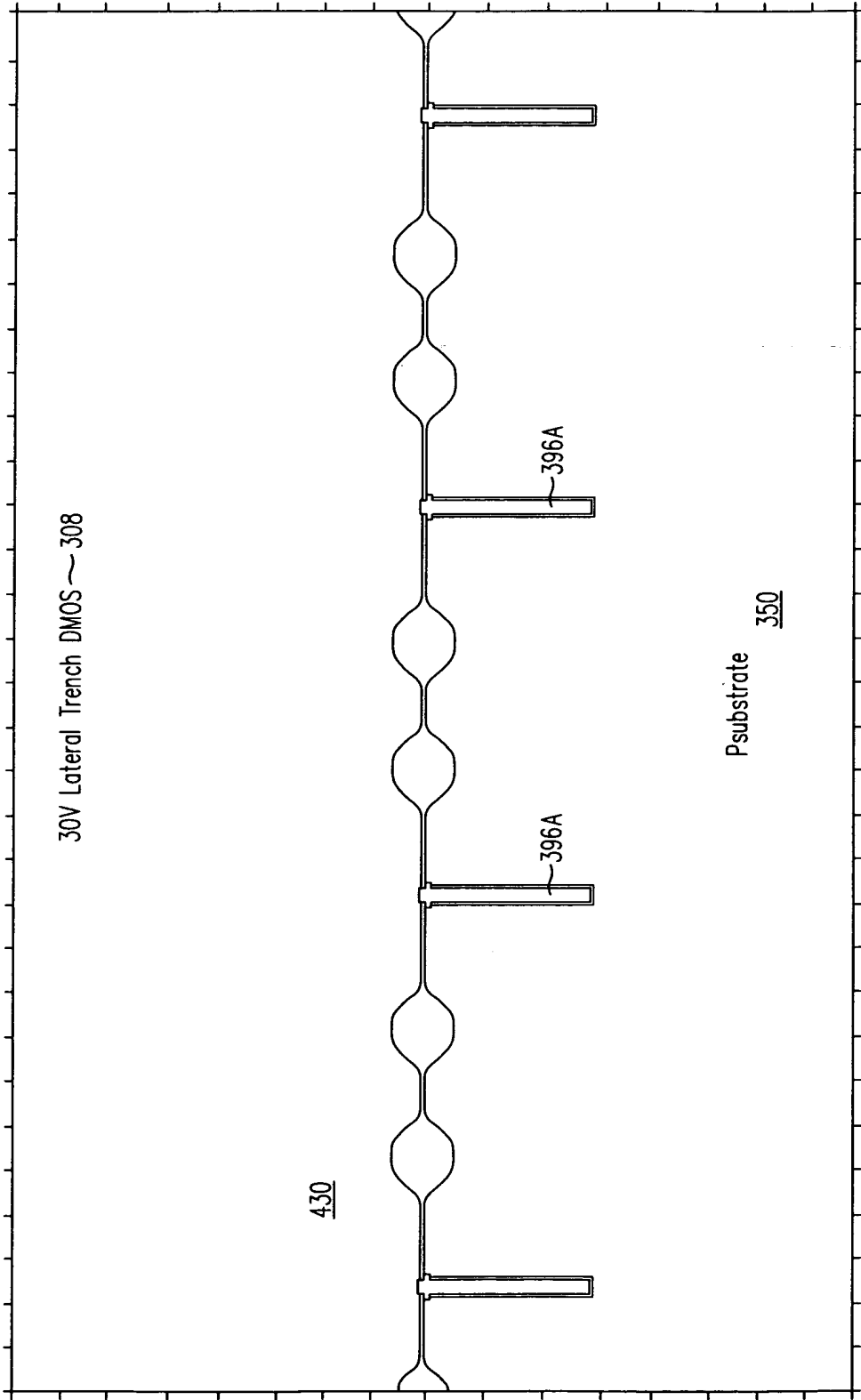
Deep N Mask and Implant

FIG. 35B



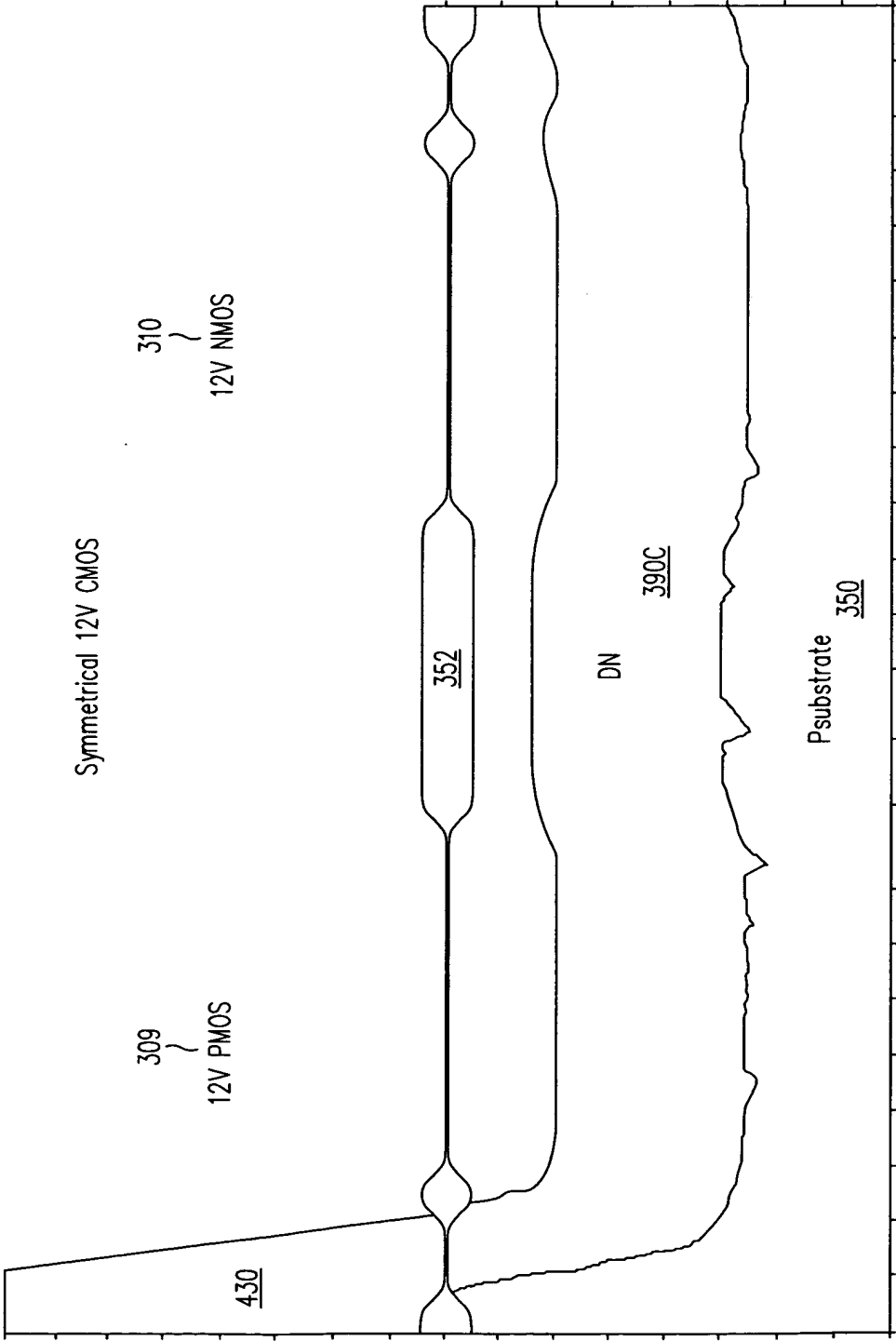
Deep N Mask and Implant

FIG. 35C



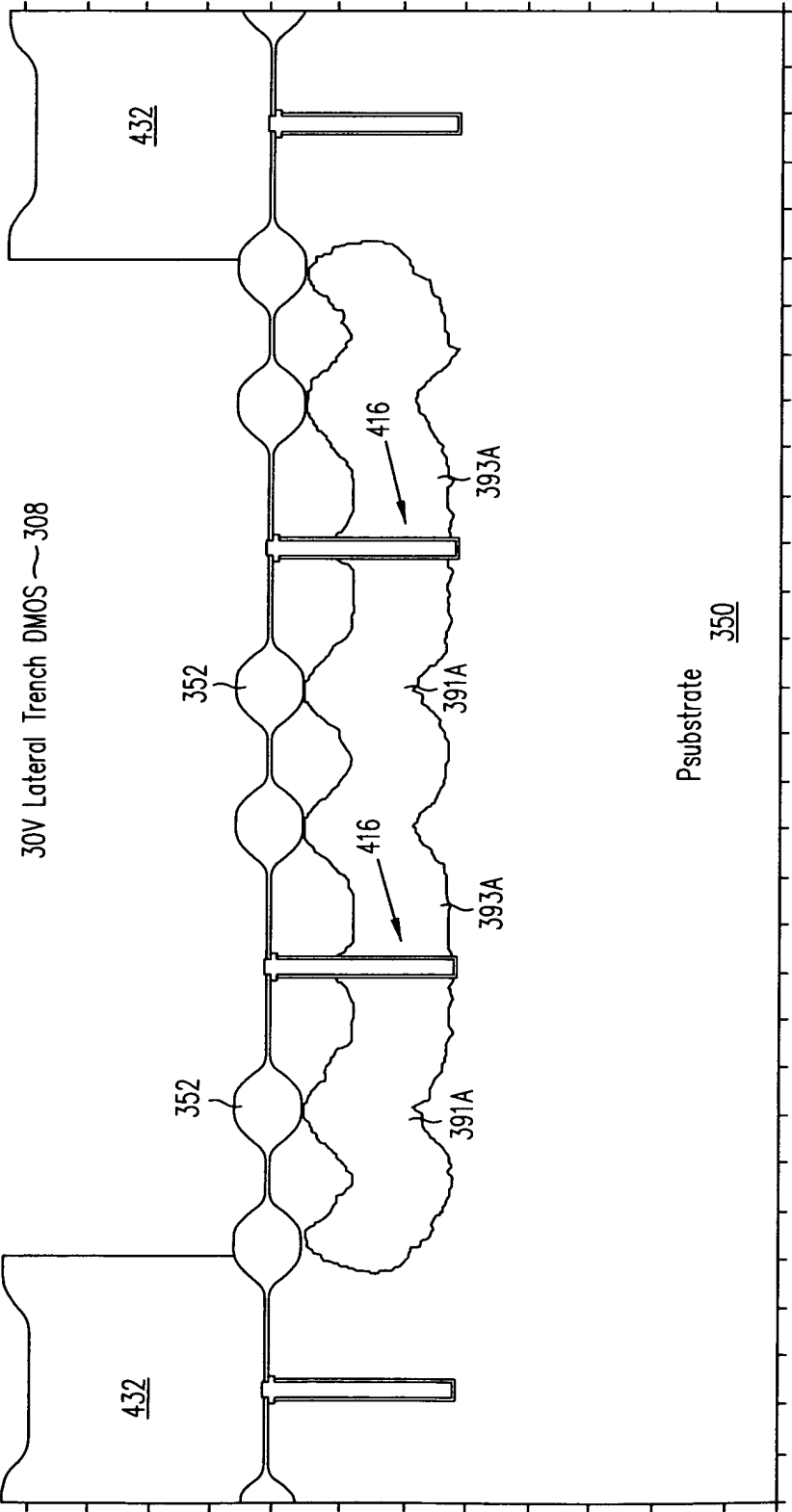
Deep N Mask and Implant

FIG. 35D



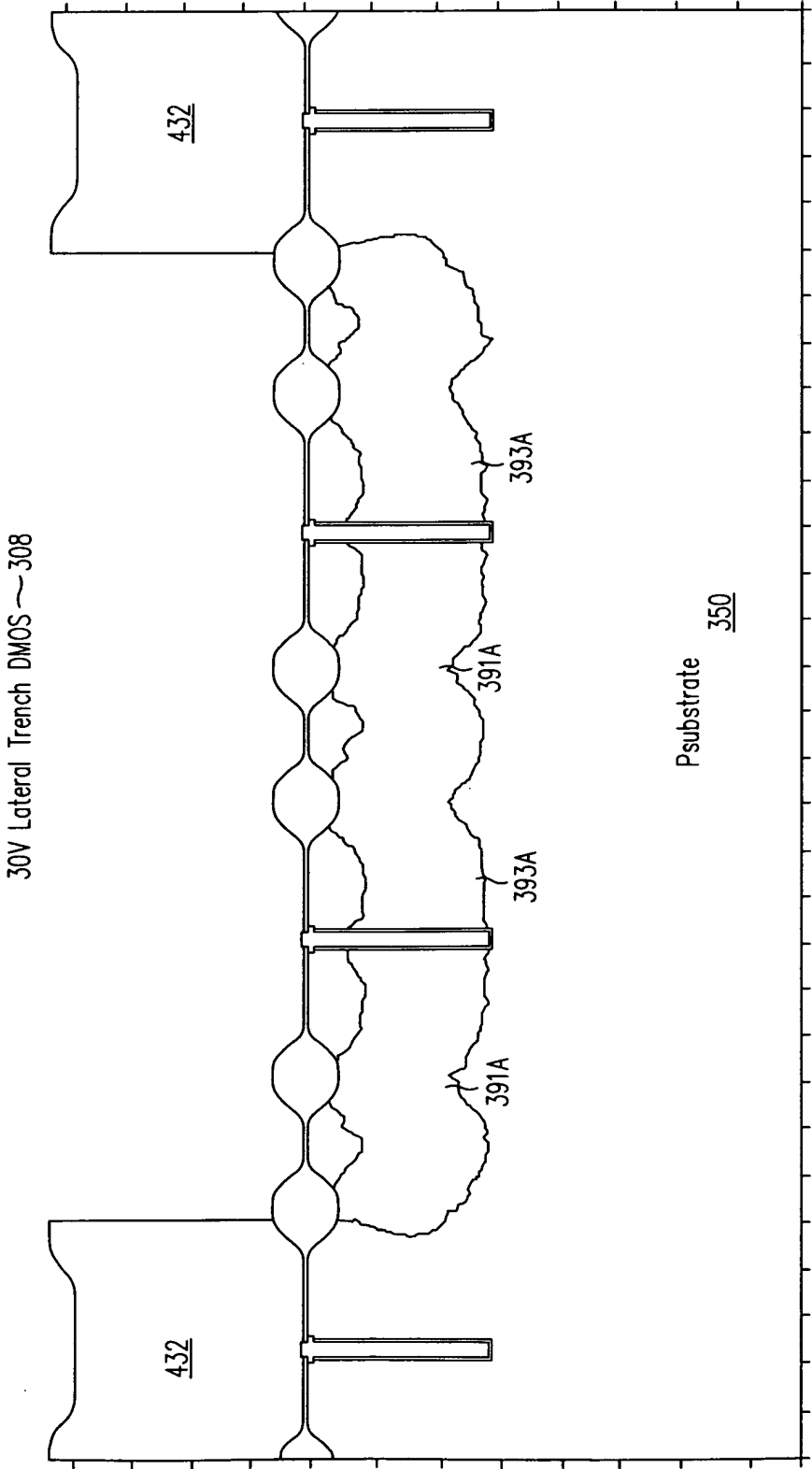
Deep N Mask and Implant

FIG. 35E



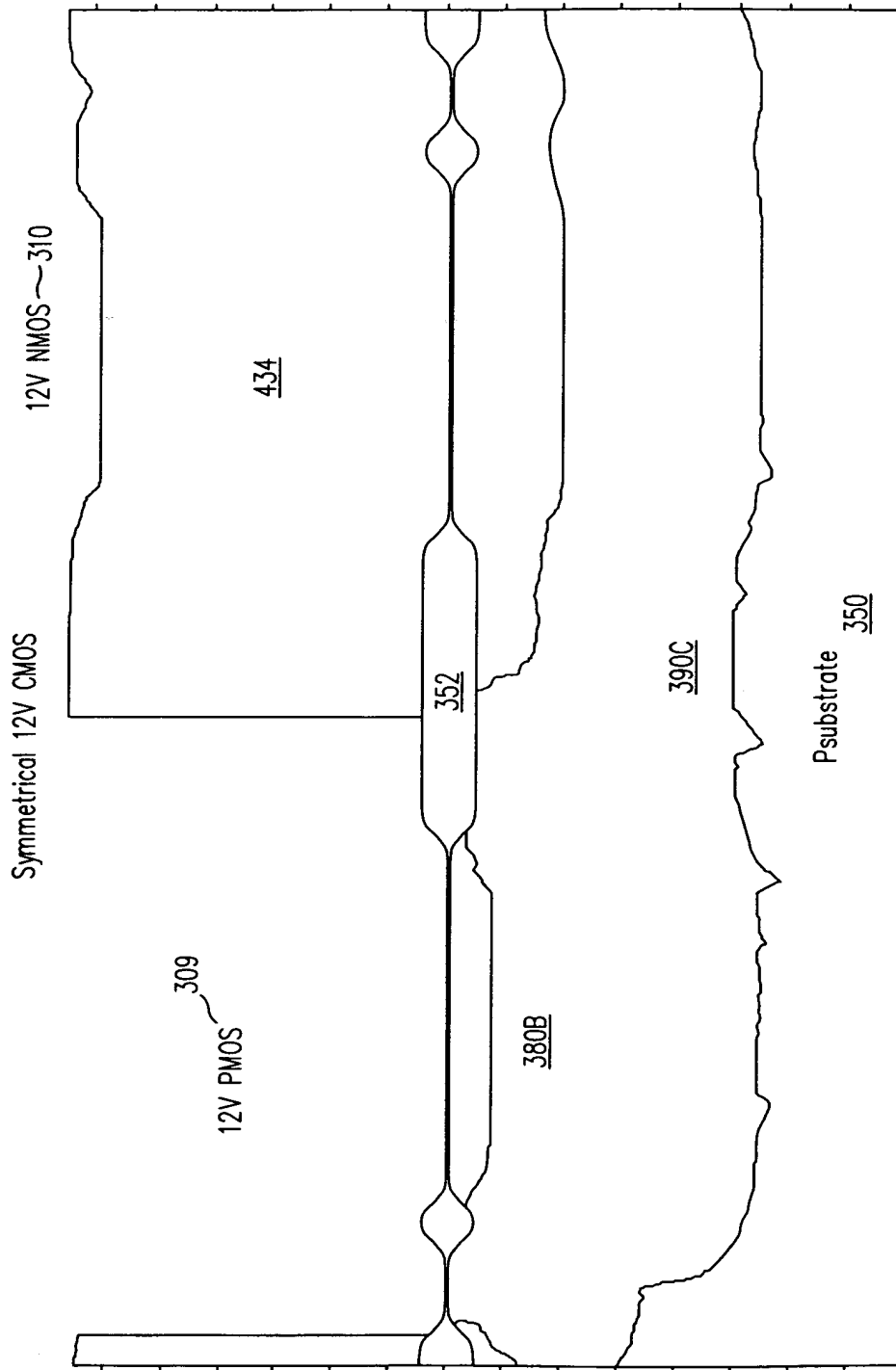
N Drift Implant-First Stage

FIG. 36D



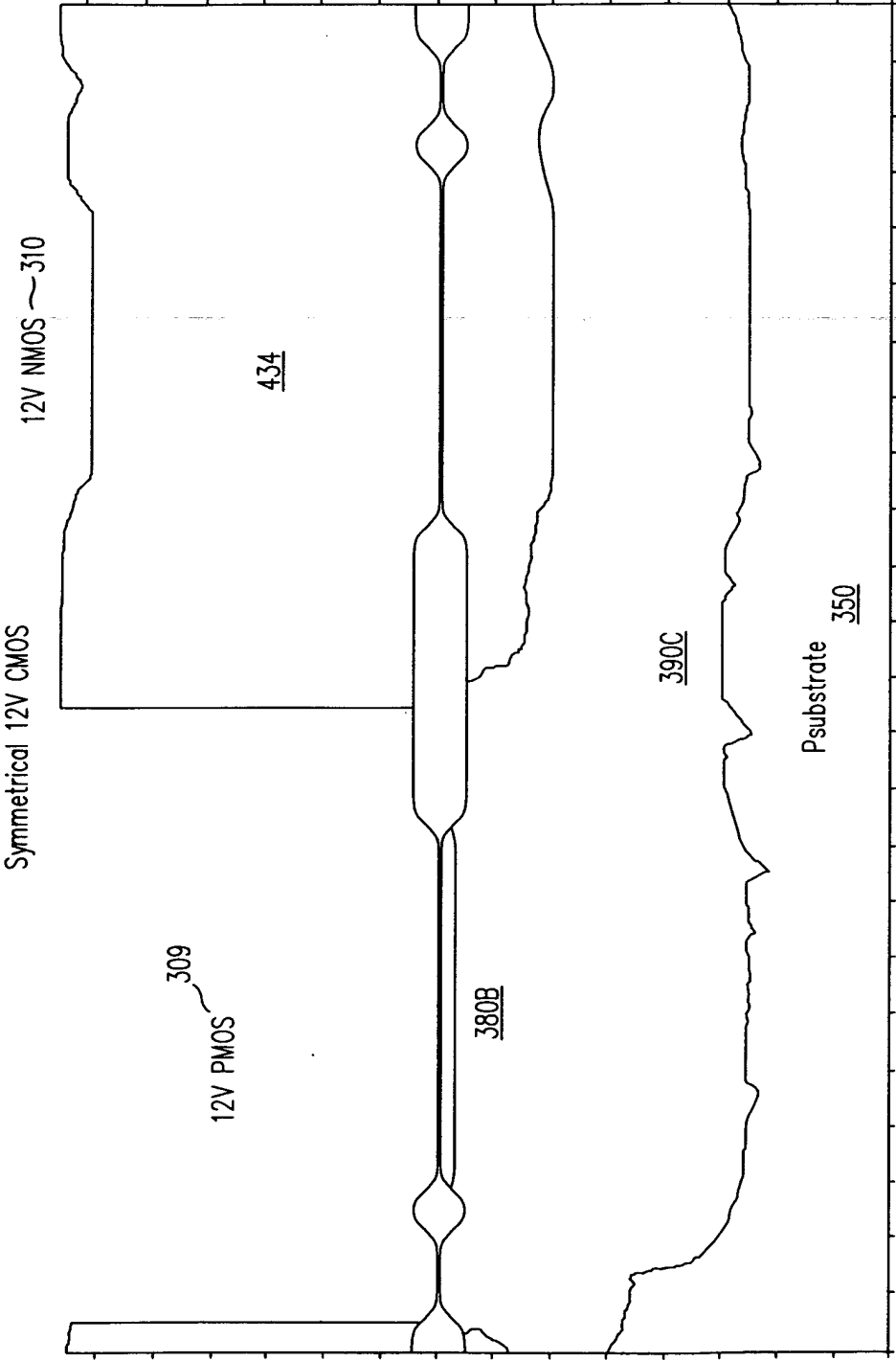
N Drift Implant-Second Stage

FIG. 37D



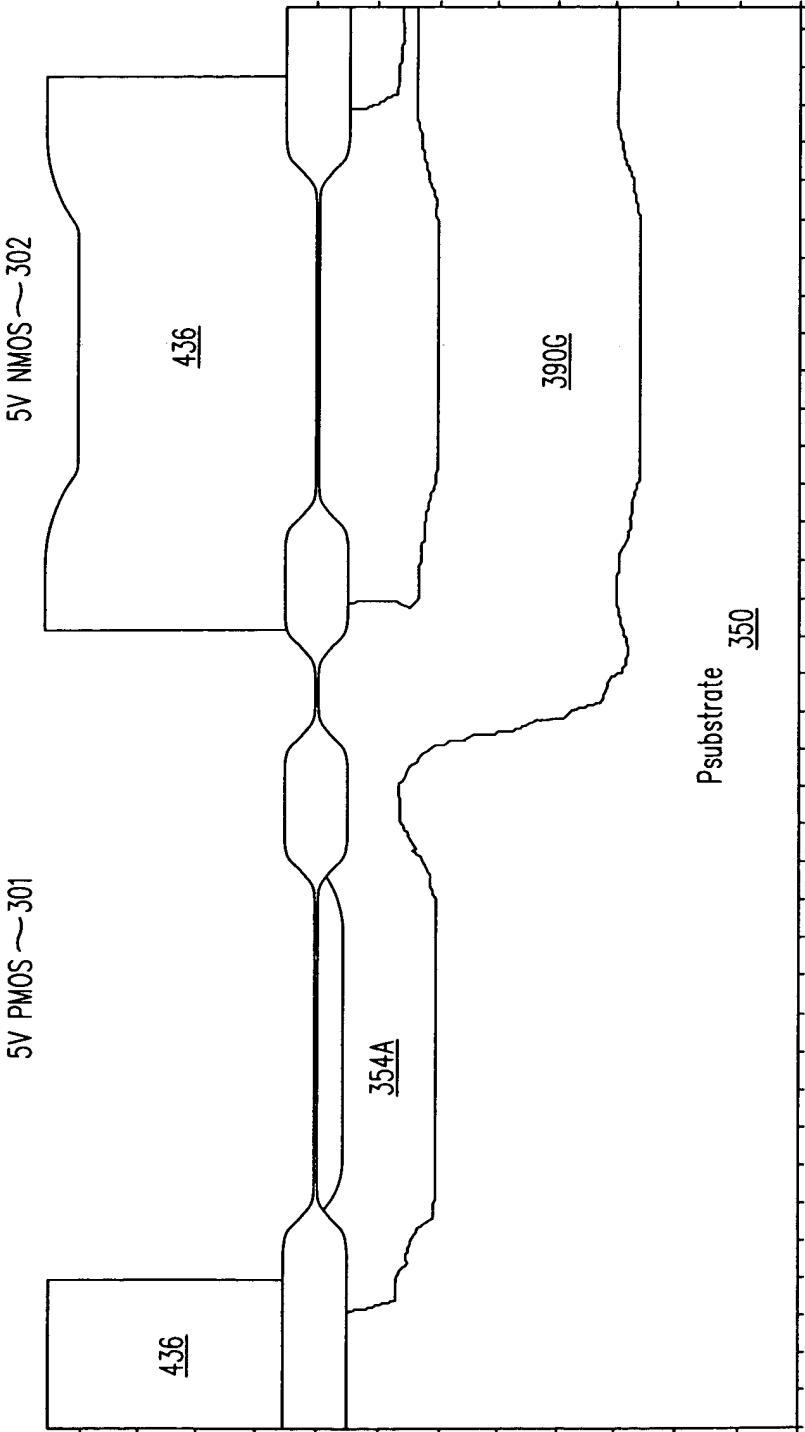
12V N Well Implant-First Stage

FIG. 38E



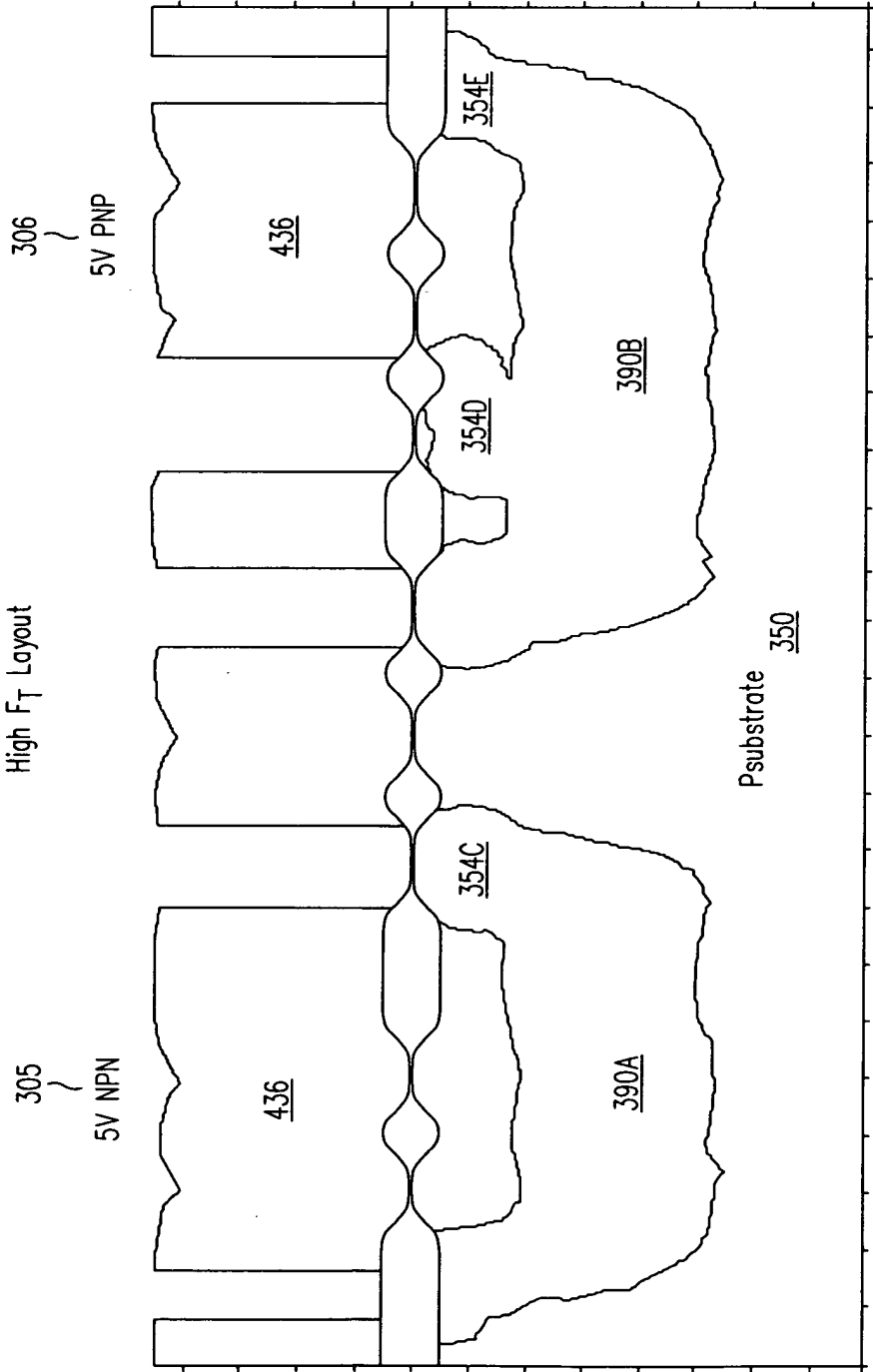
12V N Well Implant-Second Stage

FIG. 39E



5V N Well Implant-First Stage

FIG. 40A



5V N Well Implant—First Stage

FIG. 40B

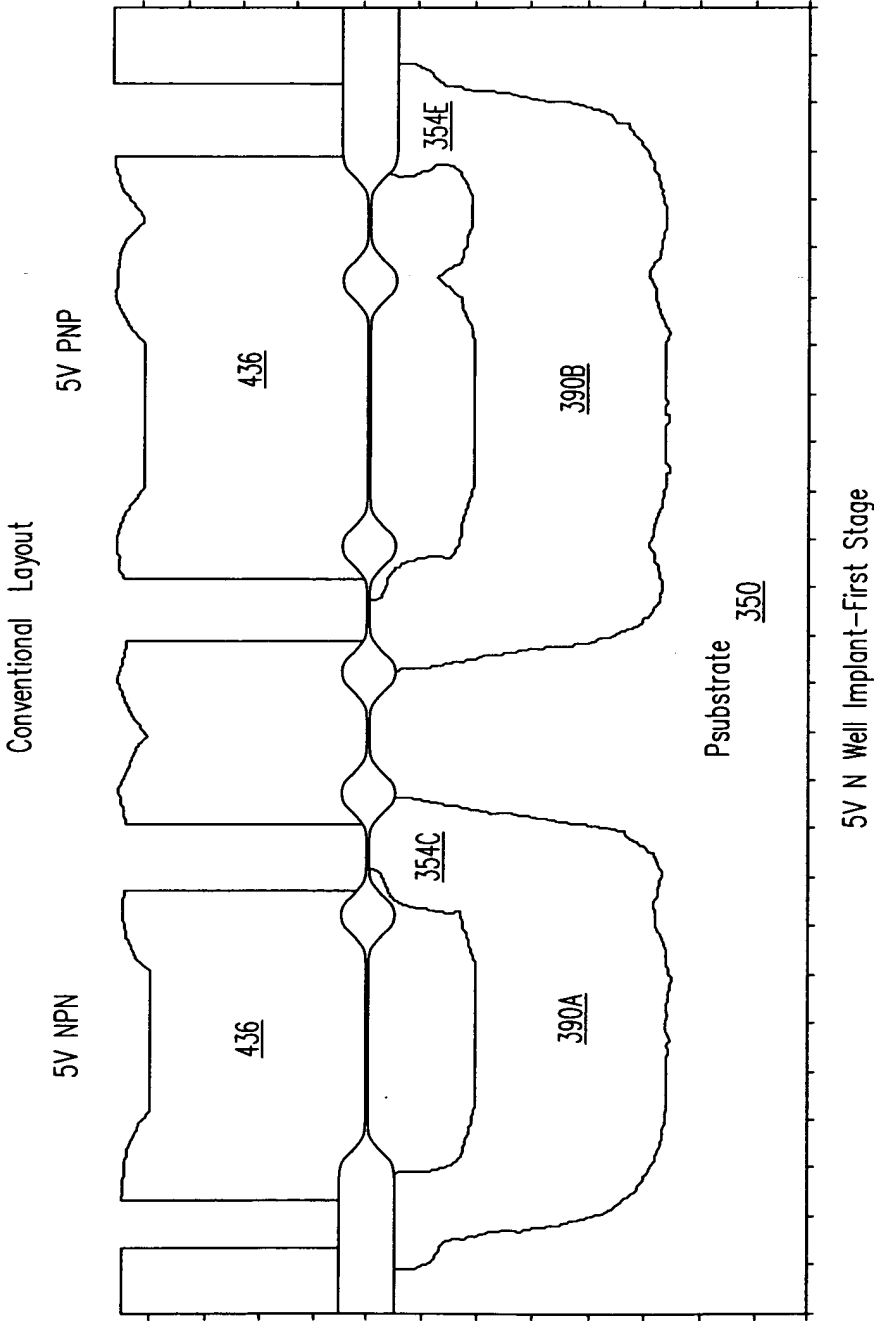
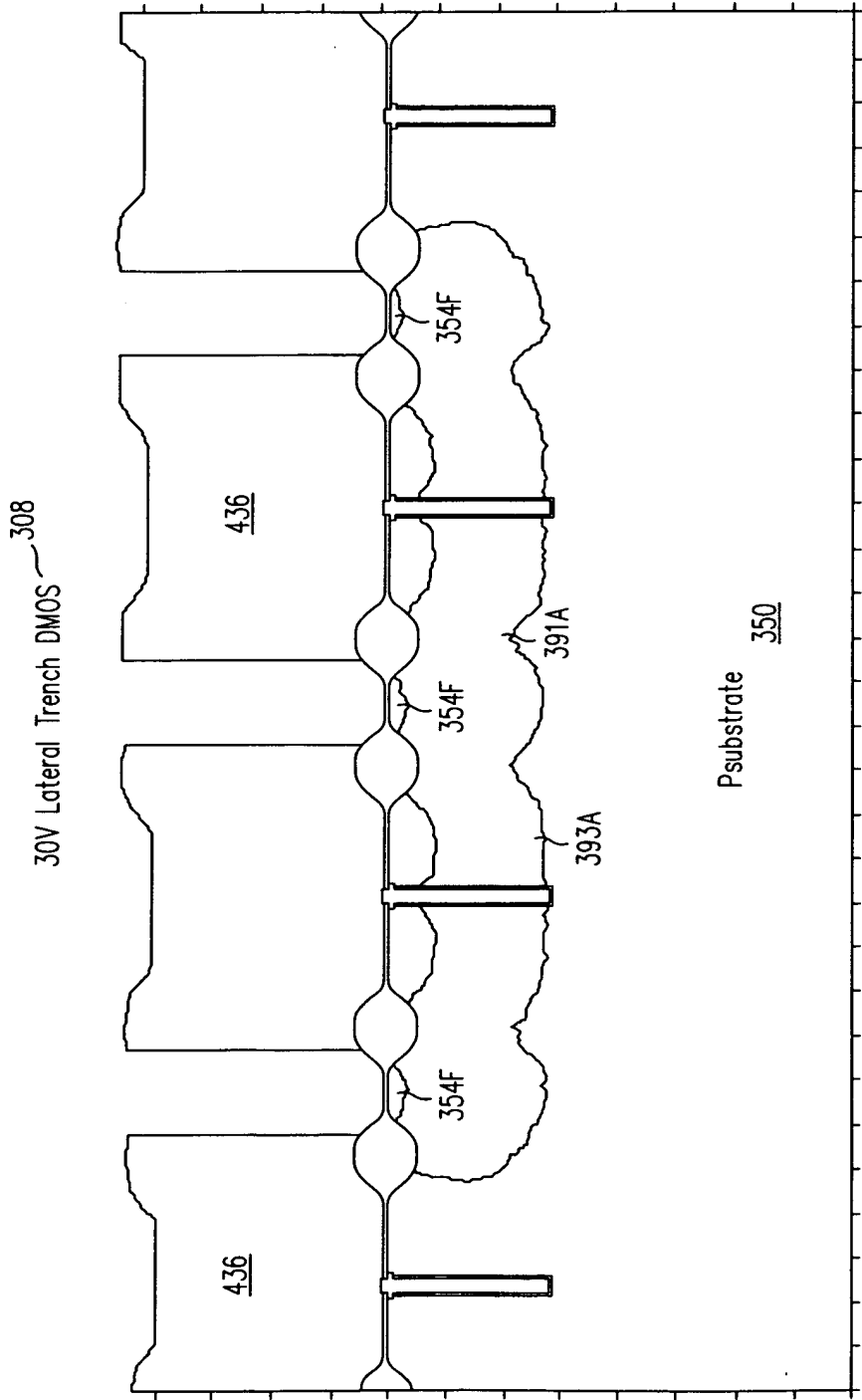
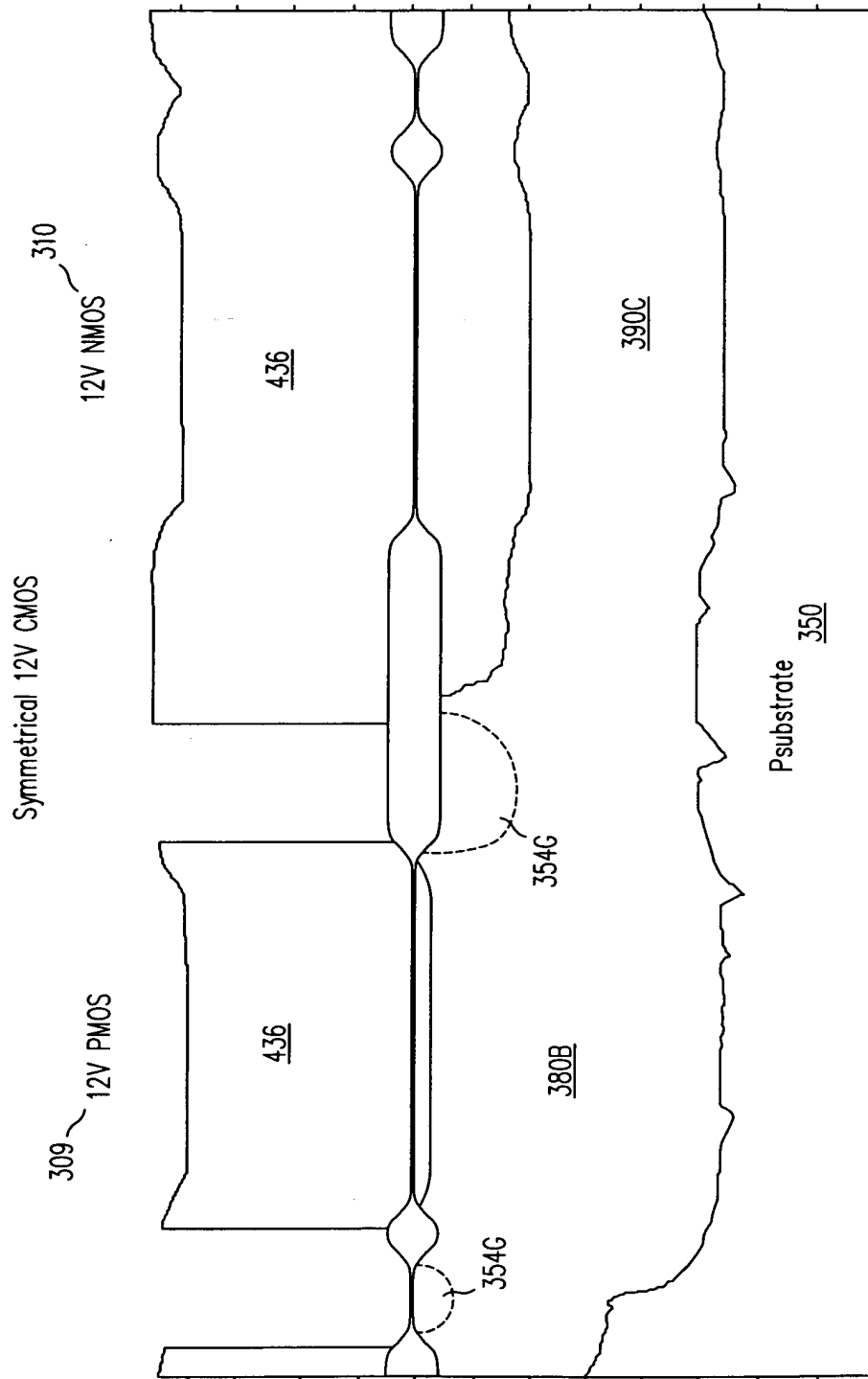


FIG. 40C



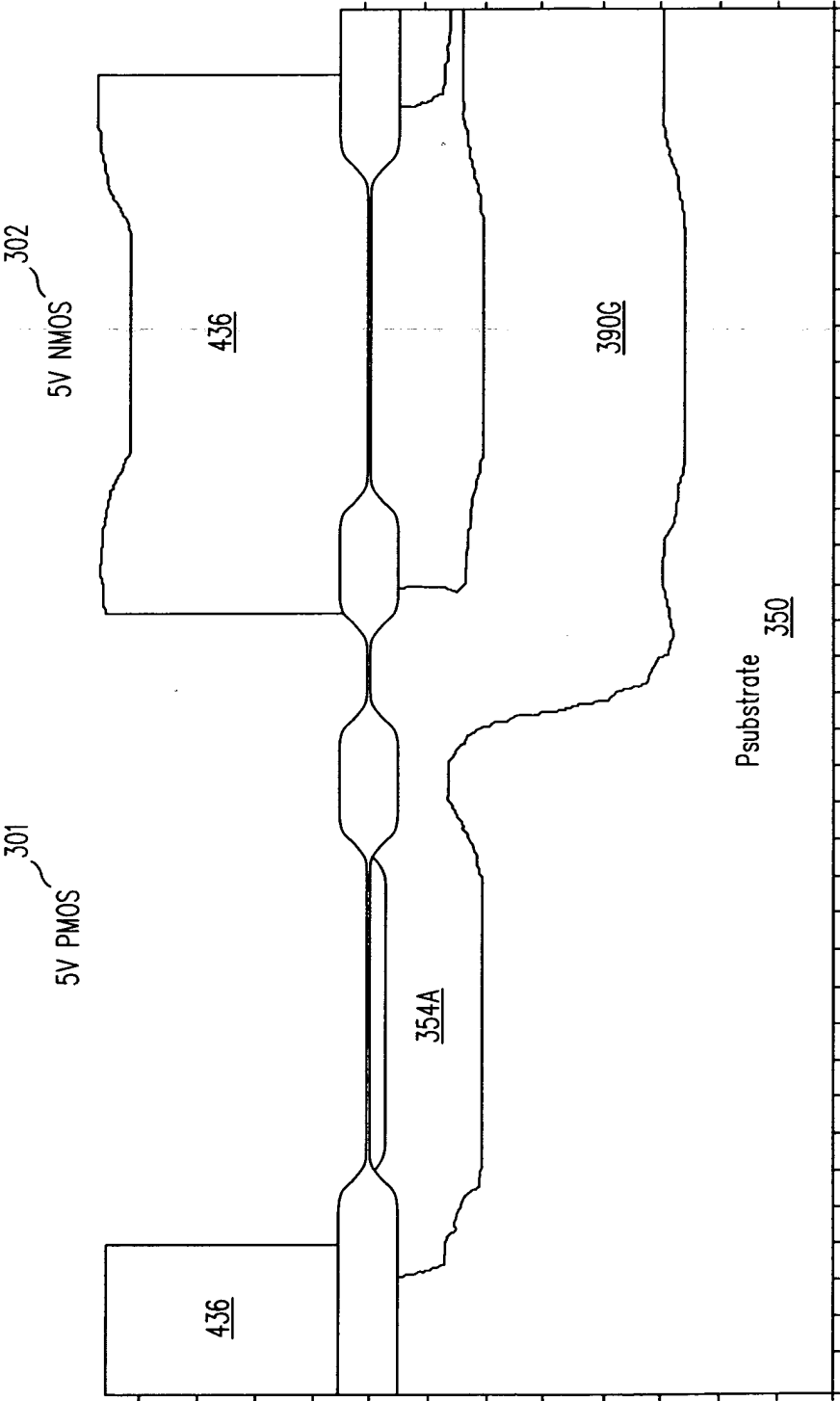
5V N Well Implant-First Stage

FIG. 40D



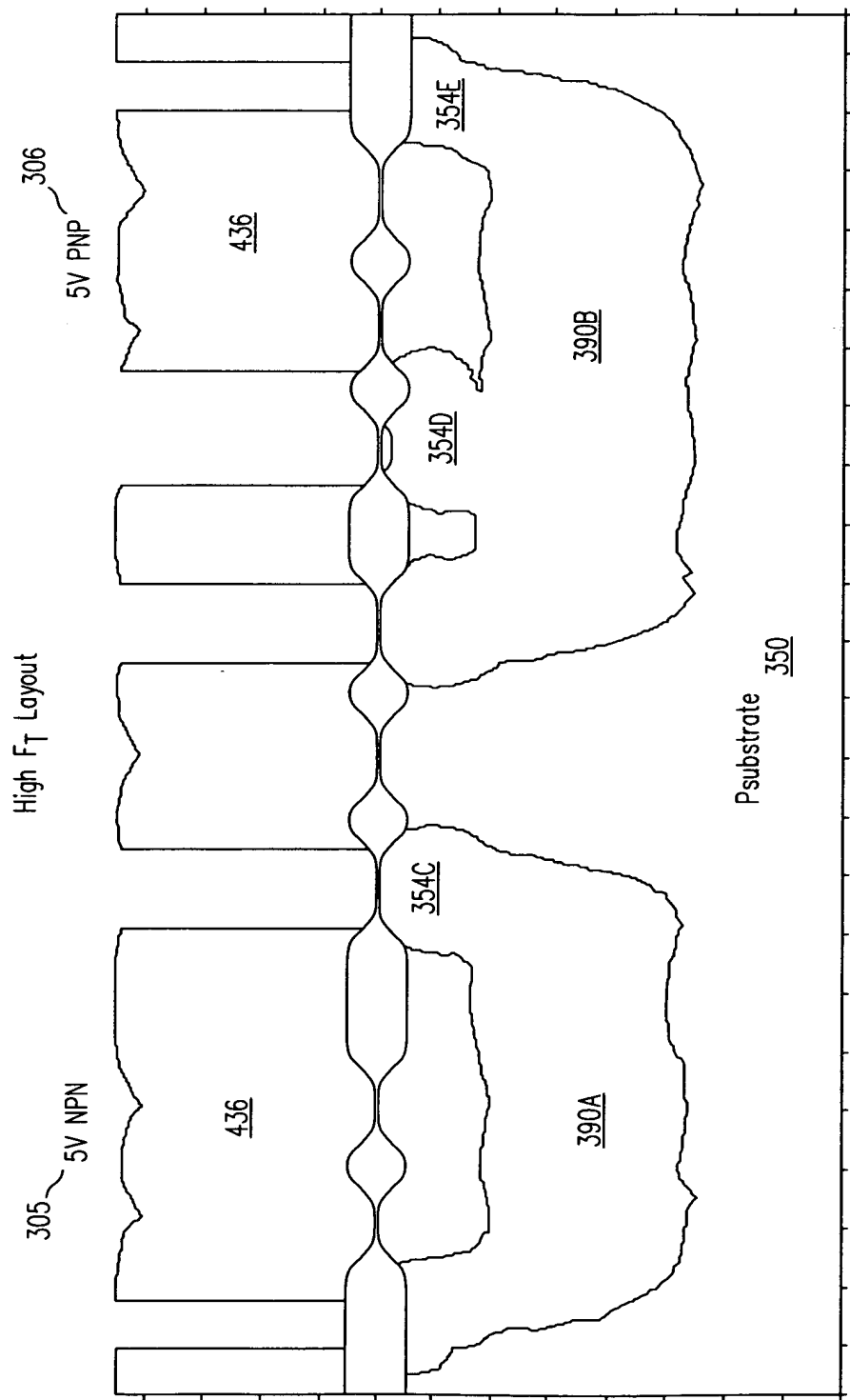
5V N Well Implant-First Stage

FIG. 40E



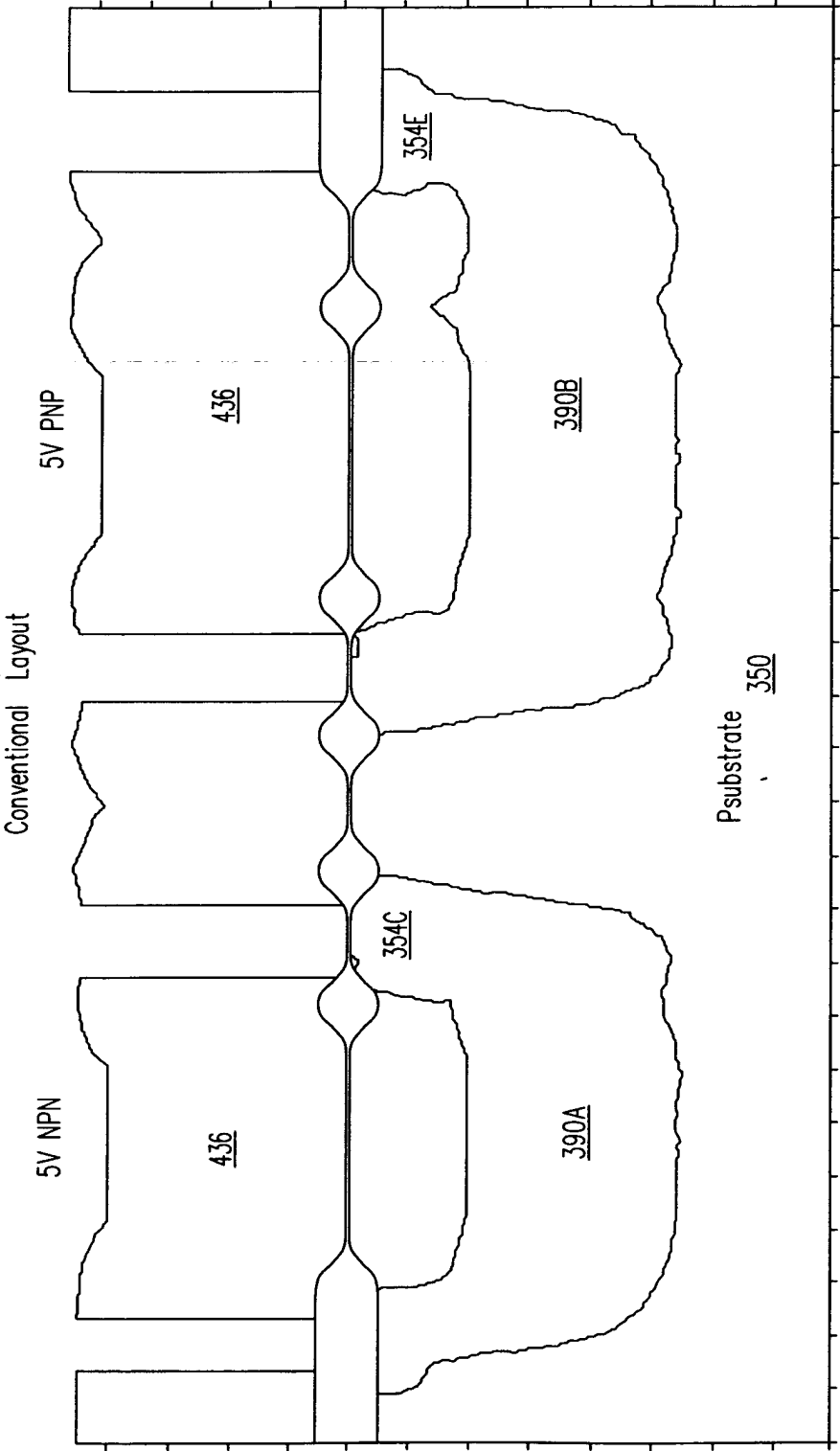
5V N Well Implant-Second Stage

FIG. 41A



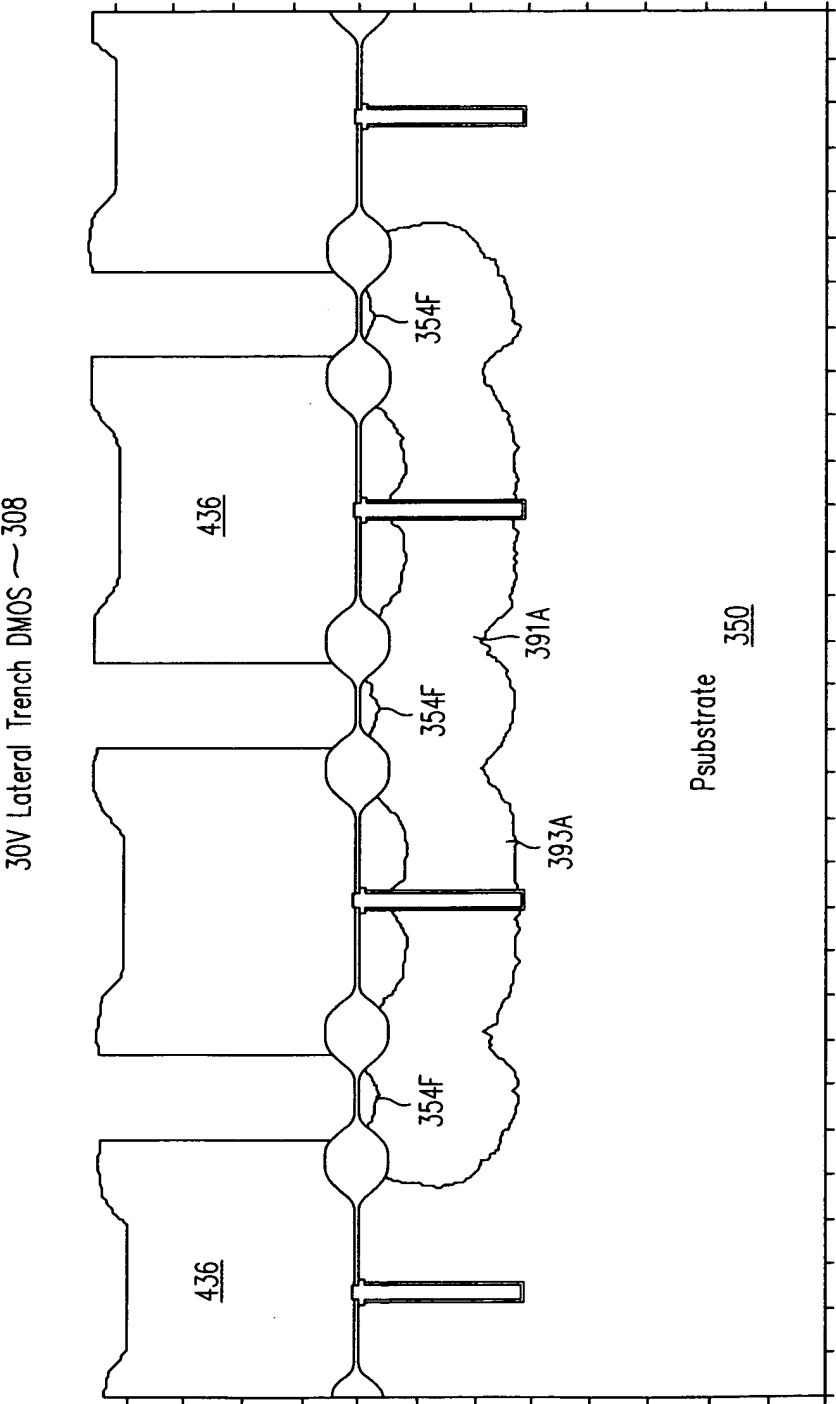
5V N Well Implant-Second Stage

FIG. 41B



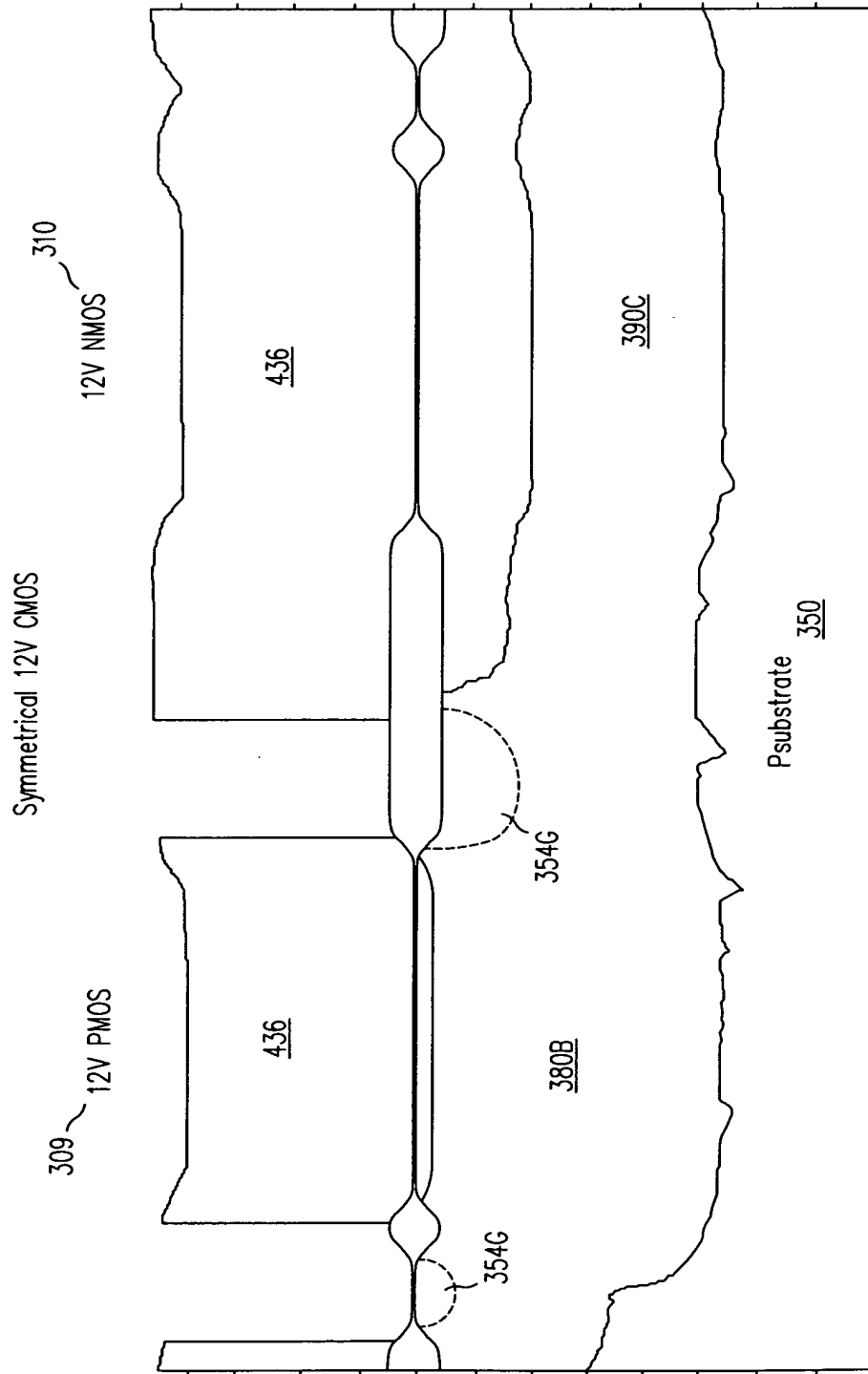
5V N Well Implant-Second Stage

FIG. 41C



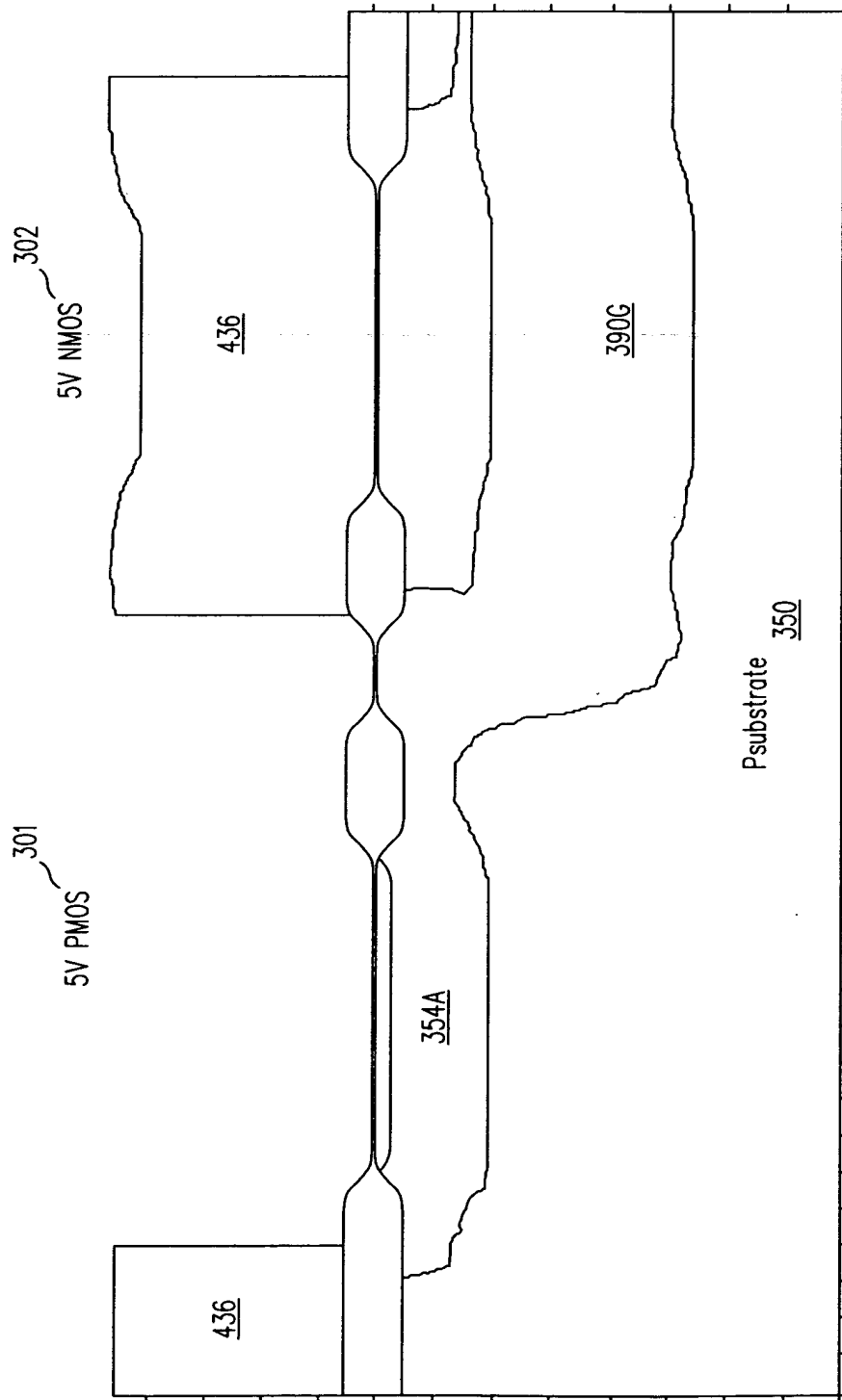
5V N Well Implant-Second Stage

FIG. 41D



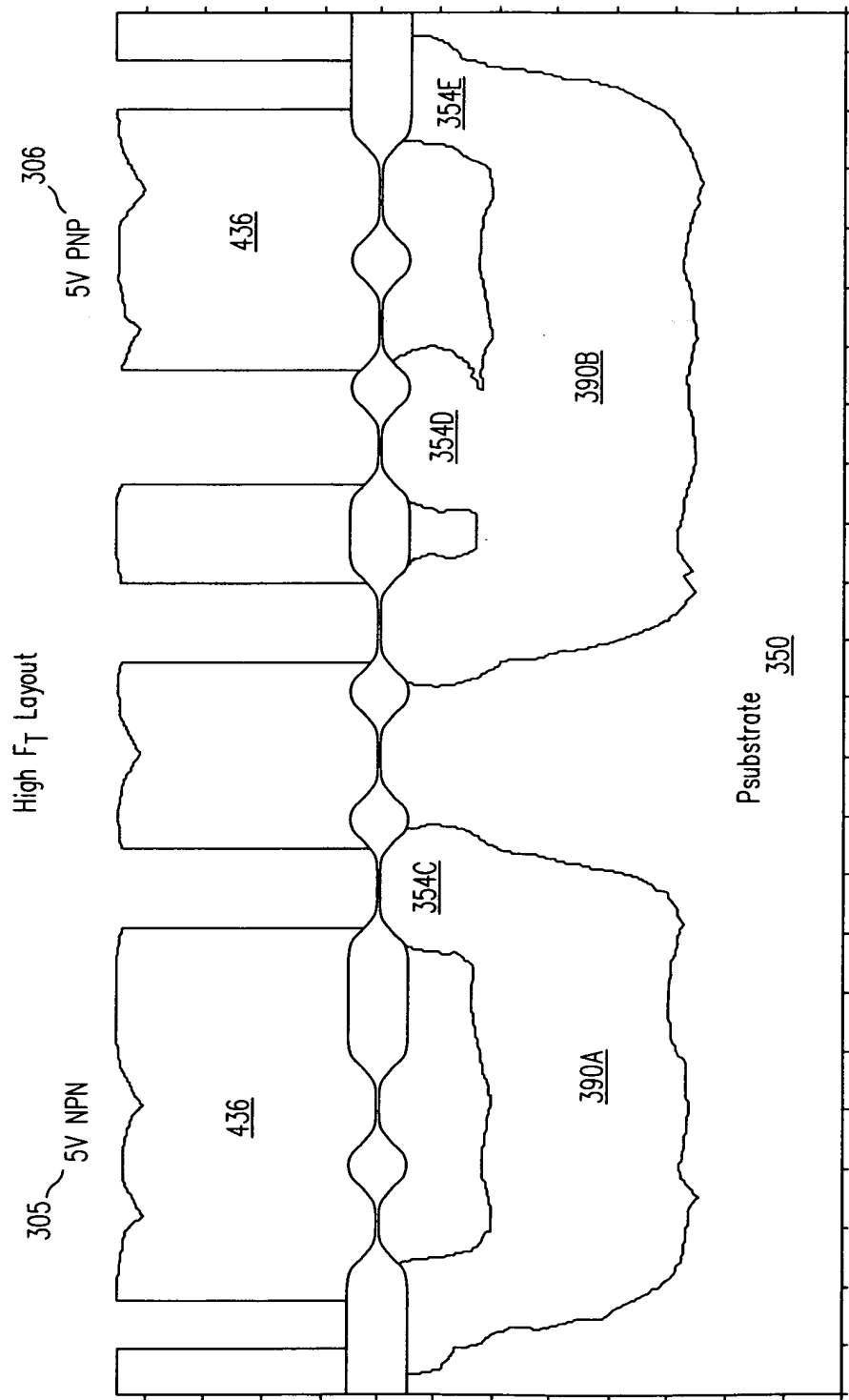
5V N Well Implant-Second Stage

FIG. 41E



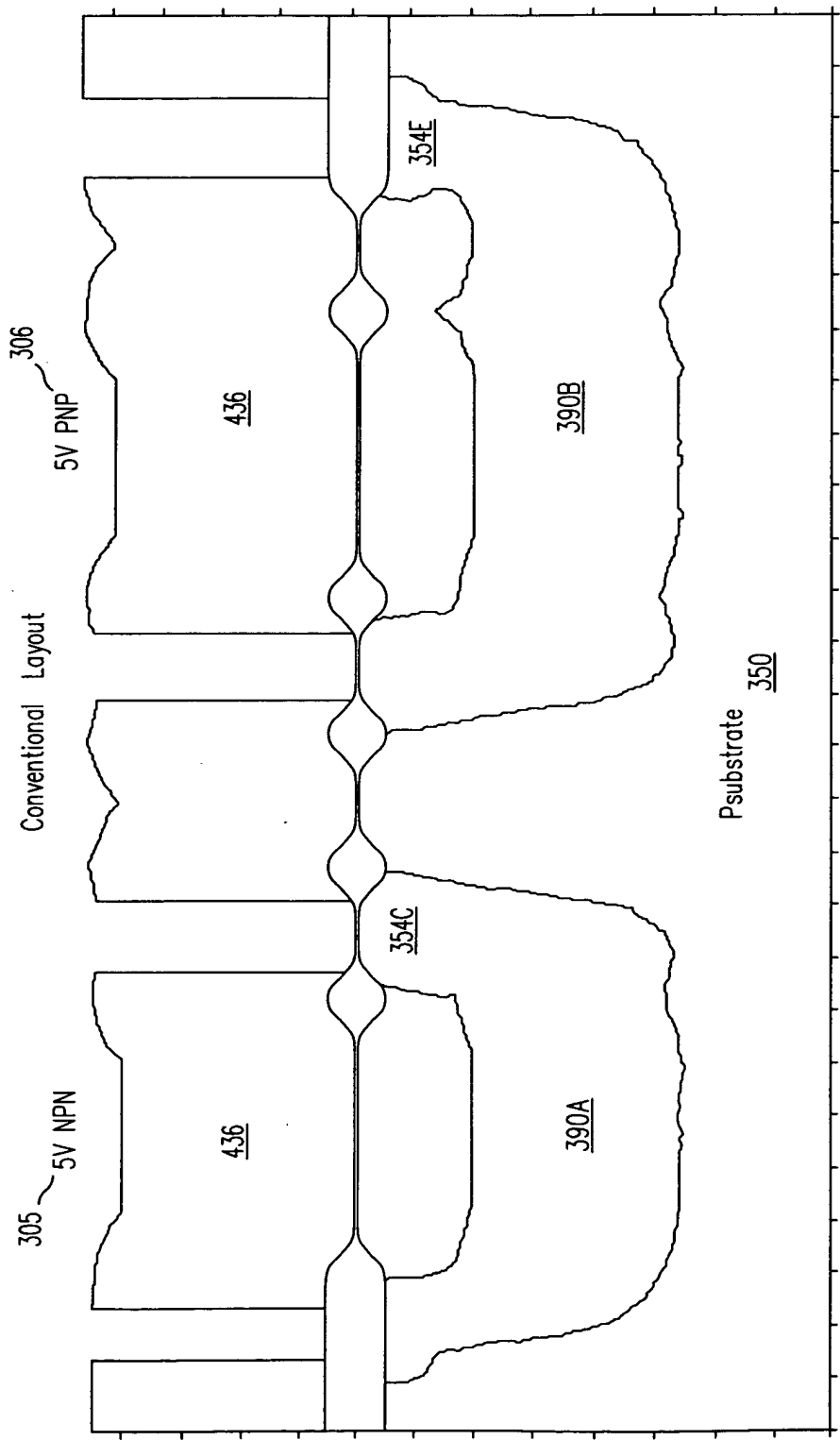
5V N Well Implant-Third Stage

FIG. 42A



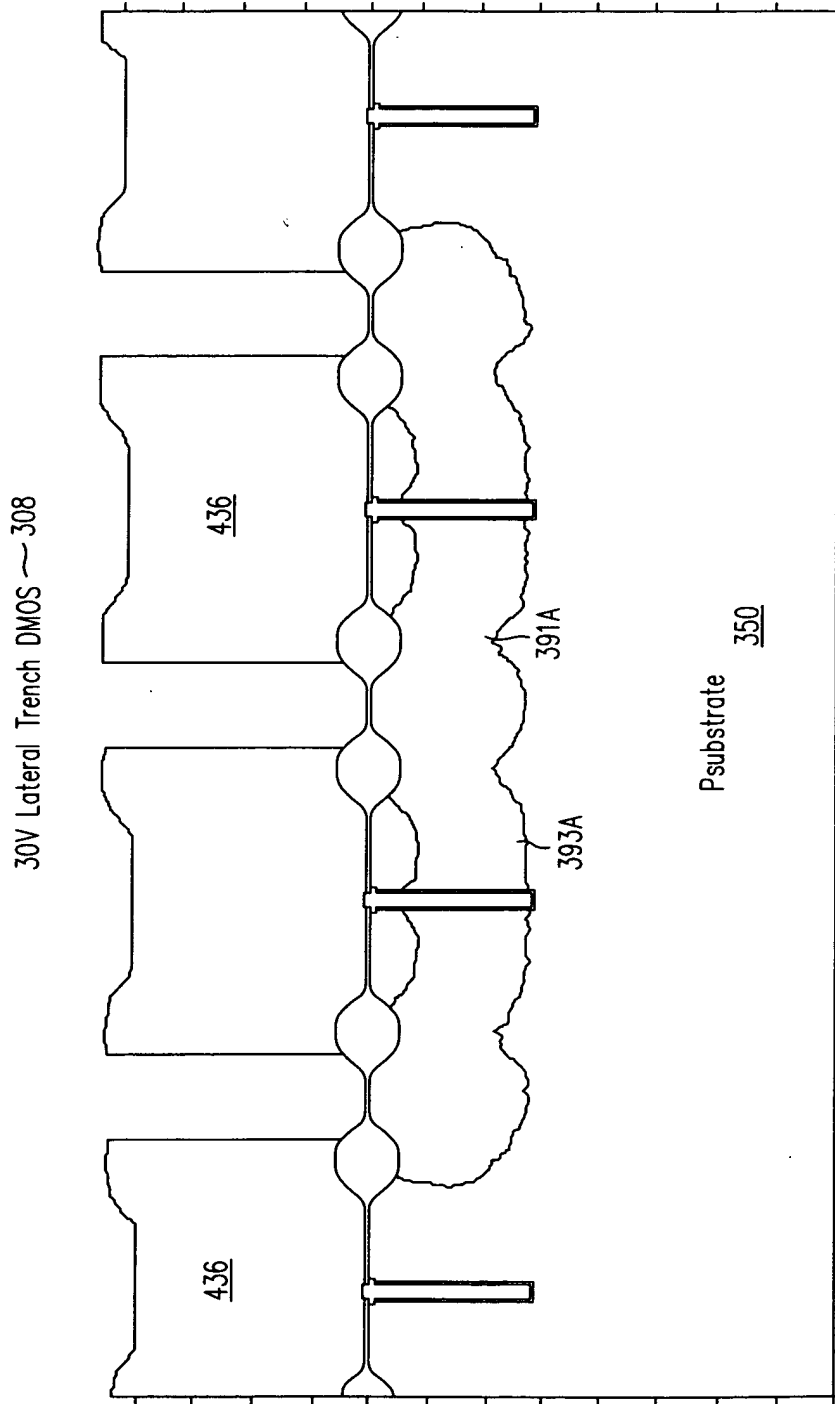
5V N Well Implant-Third Stage

FIG. 42B



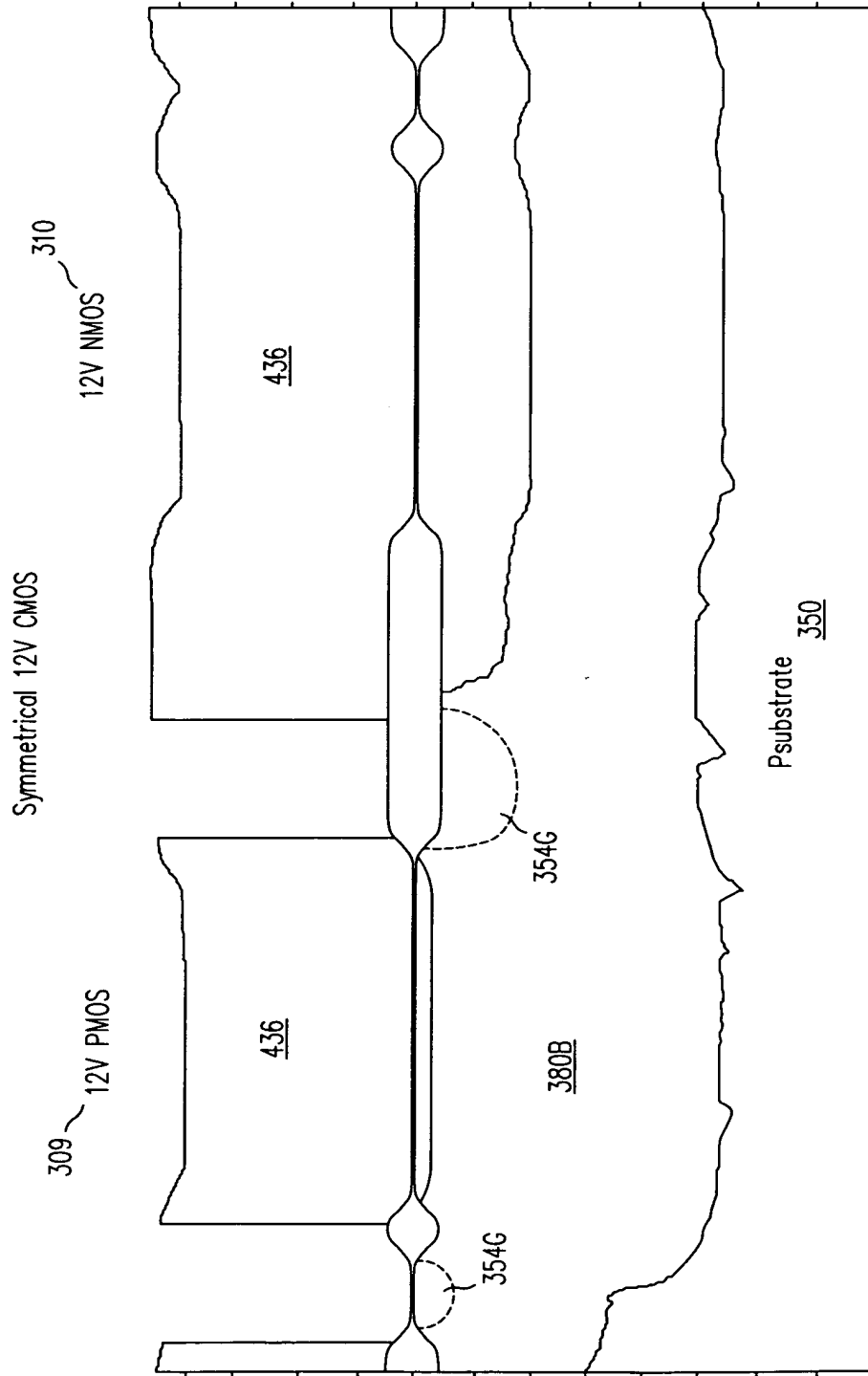
5V N Well Implant-Third Stage

FIG. 42C



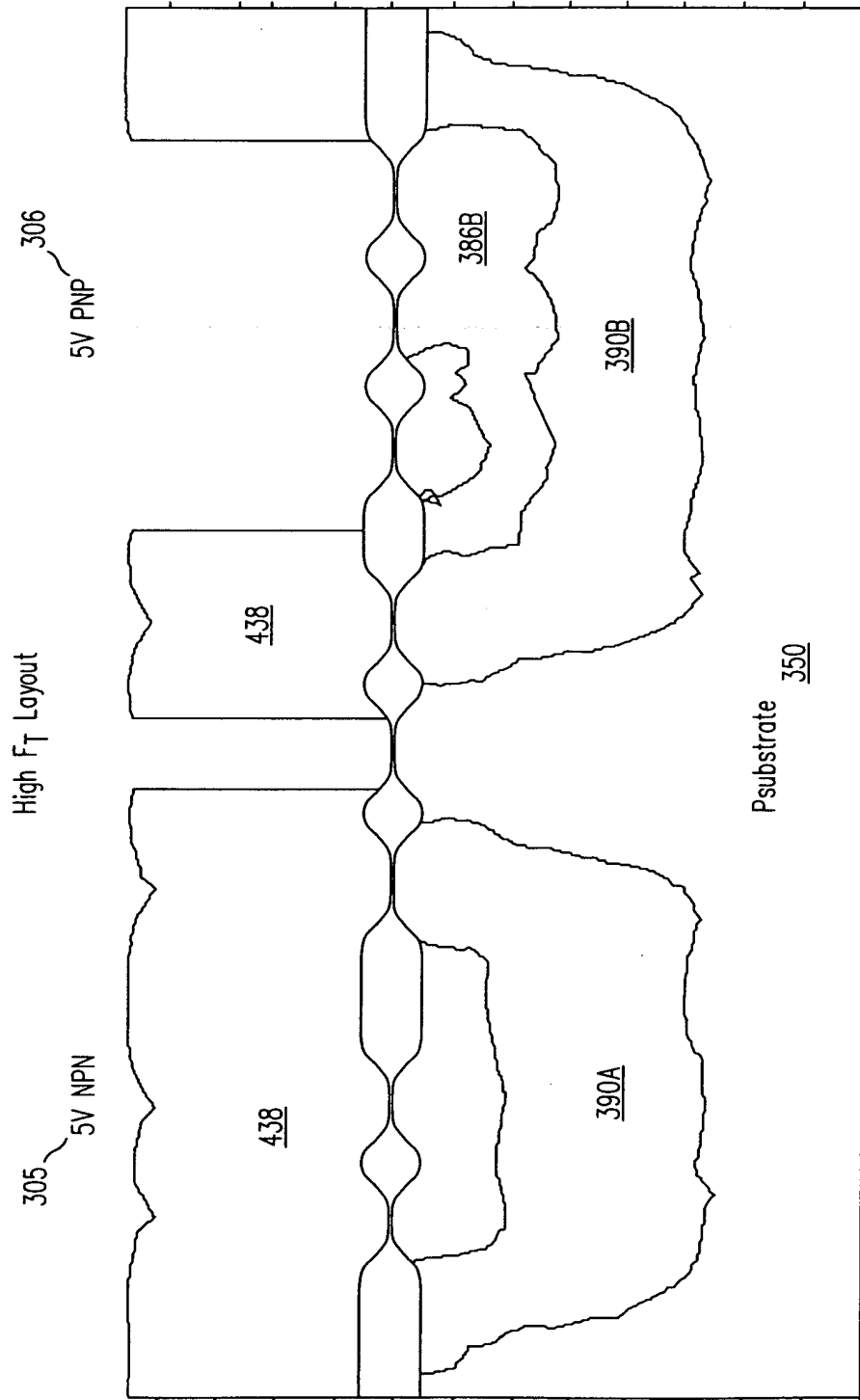
5V N Well Implant-Third Stage

FIG. 42D



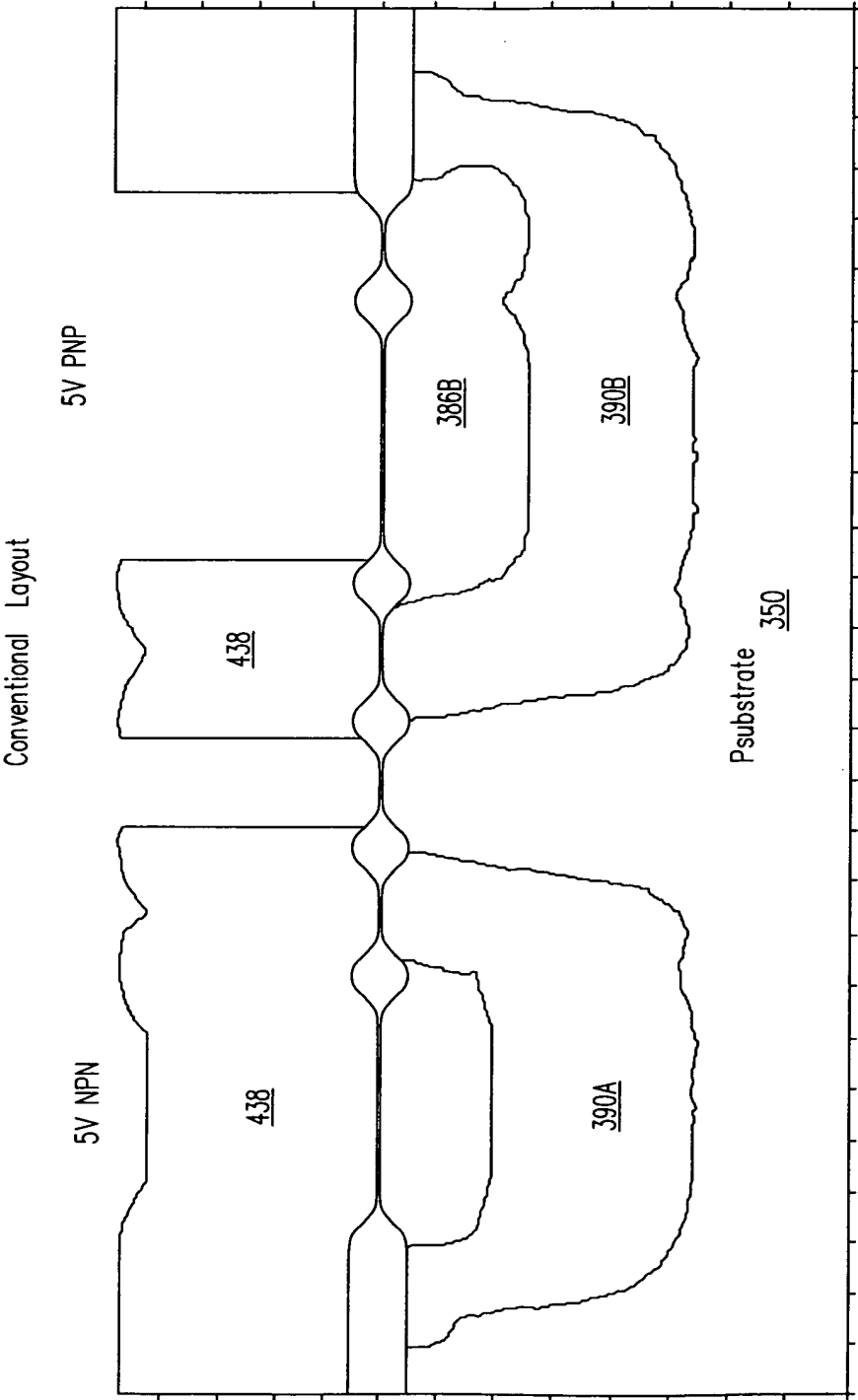
5V N Well Implant-Third Stage

FIG. 42E



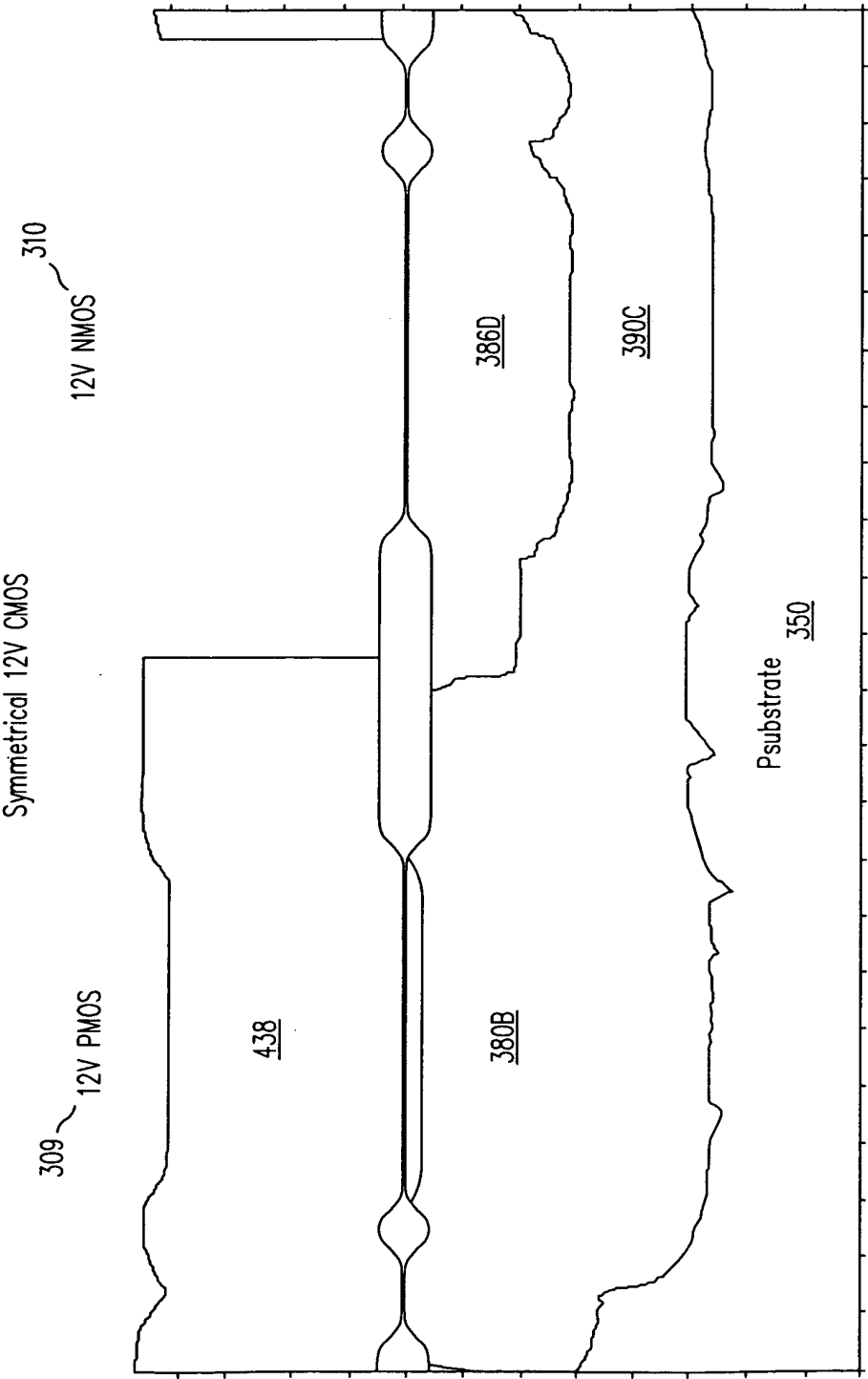
12V P Well Implant-First Stage

FIG. 43B

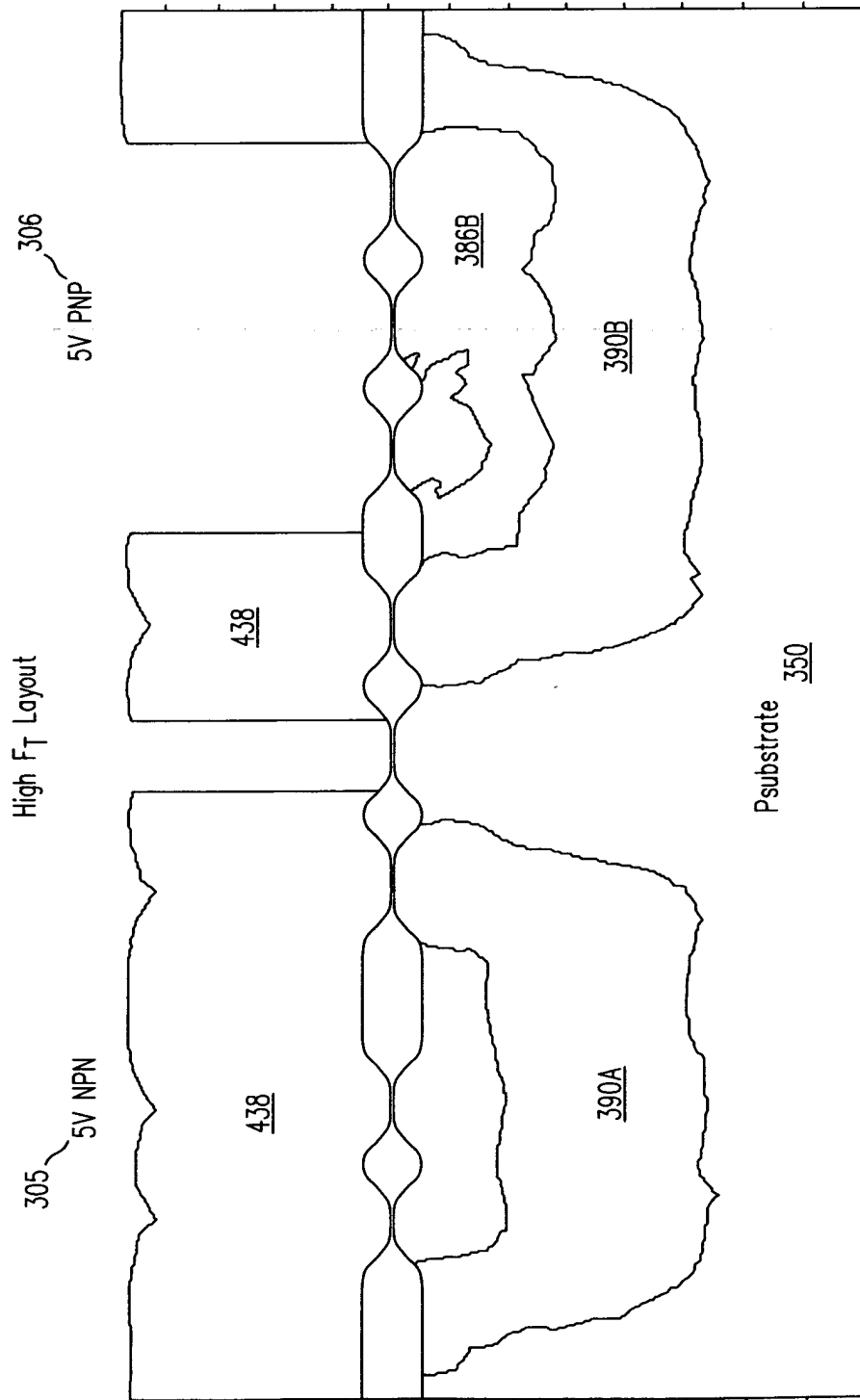


12V P Well Implant-First Stage

FIG. 43C

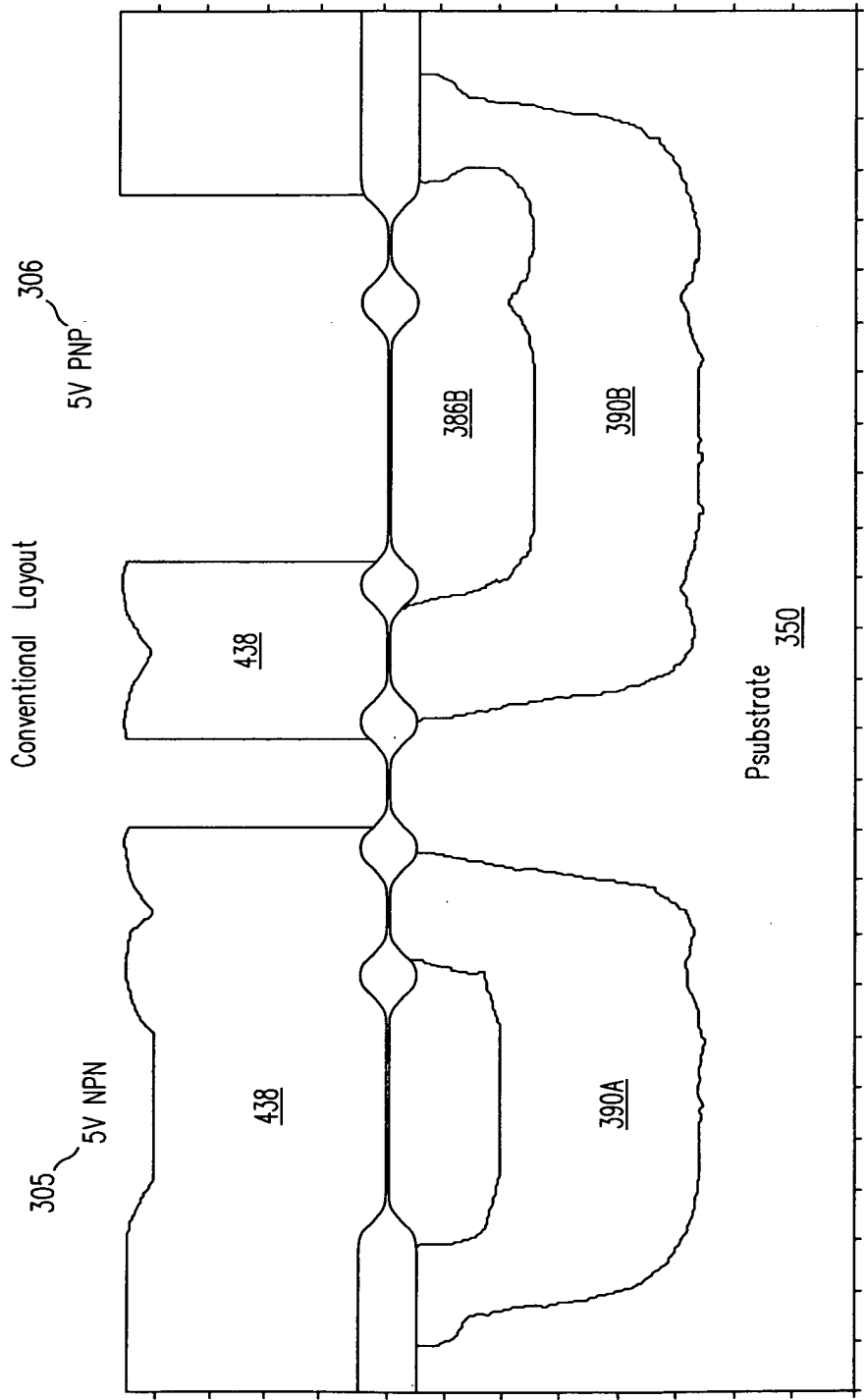


12V P Well Implant-First Stage
FIG. 43E



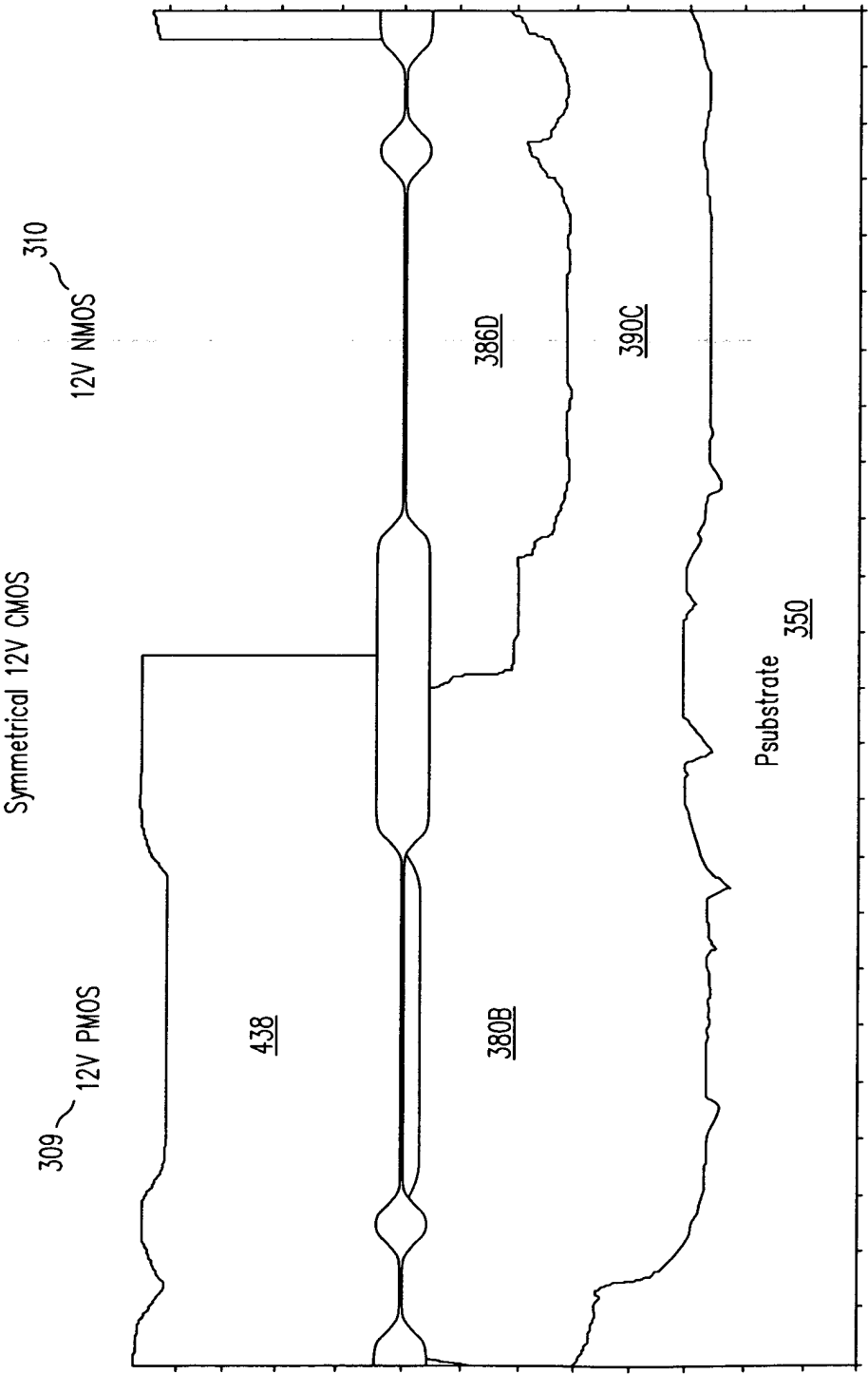
12V P Well Implant—Second Stage

FIG. 44B

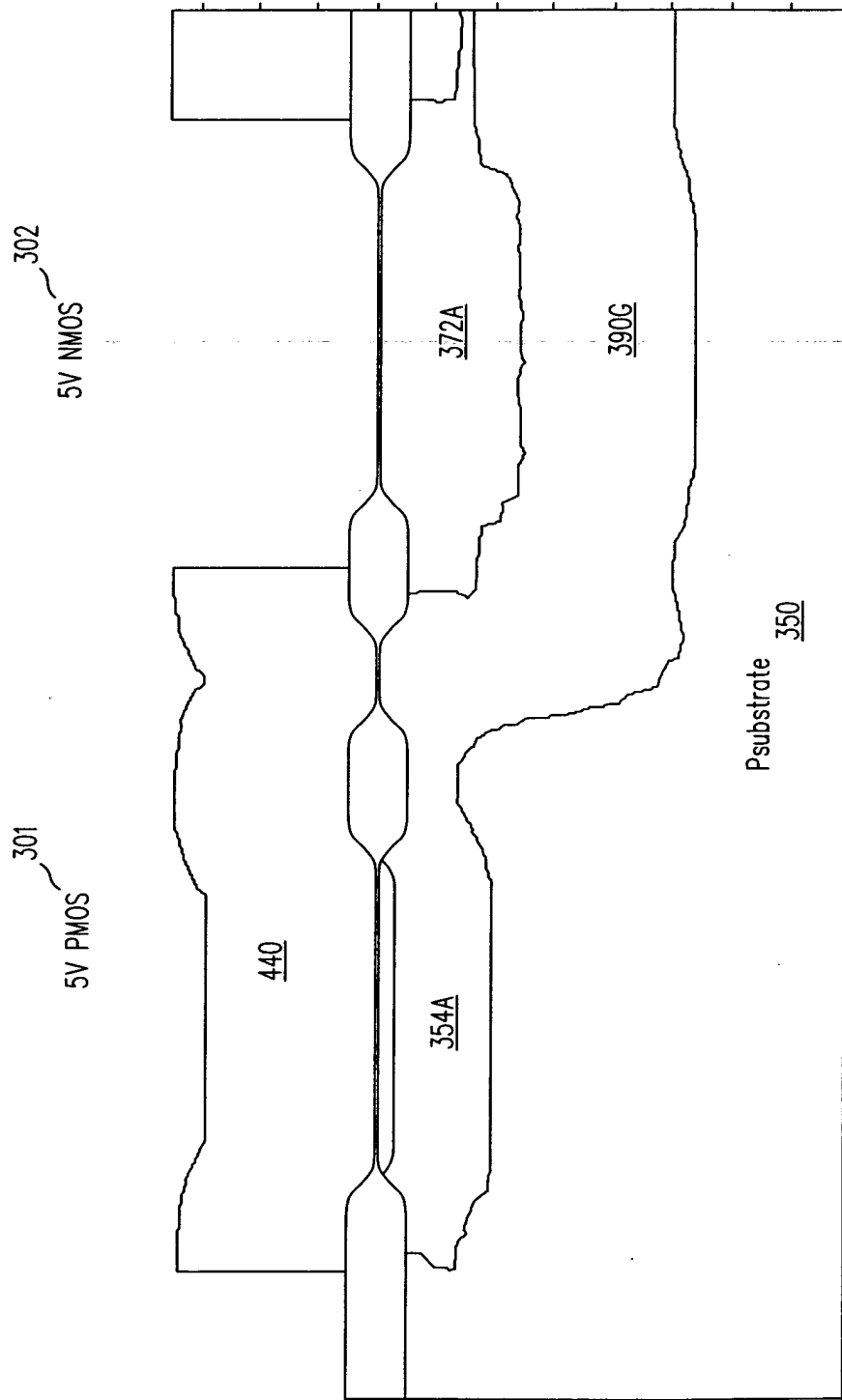


12V P Well Implant-Second Stage

FIG. 44C

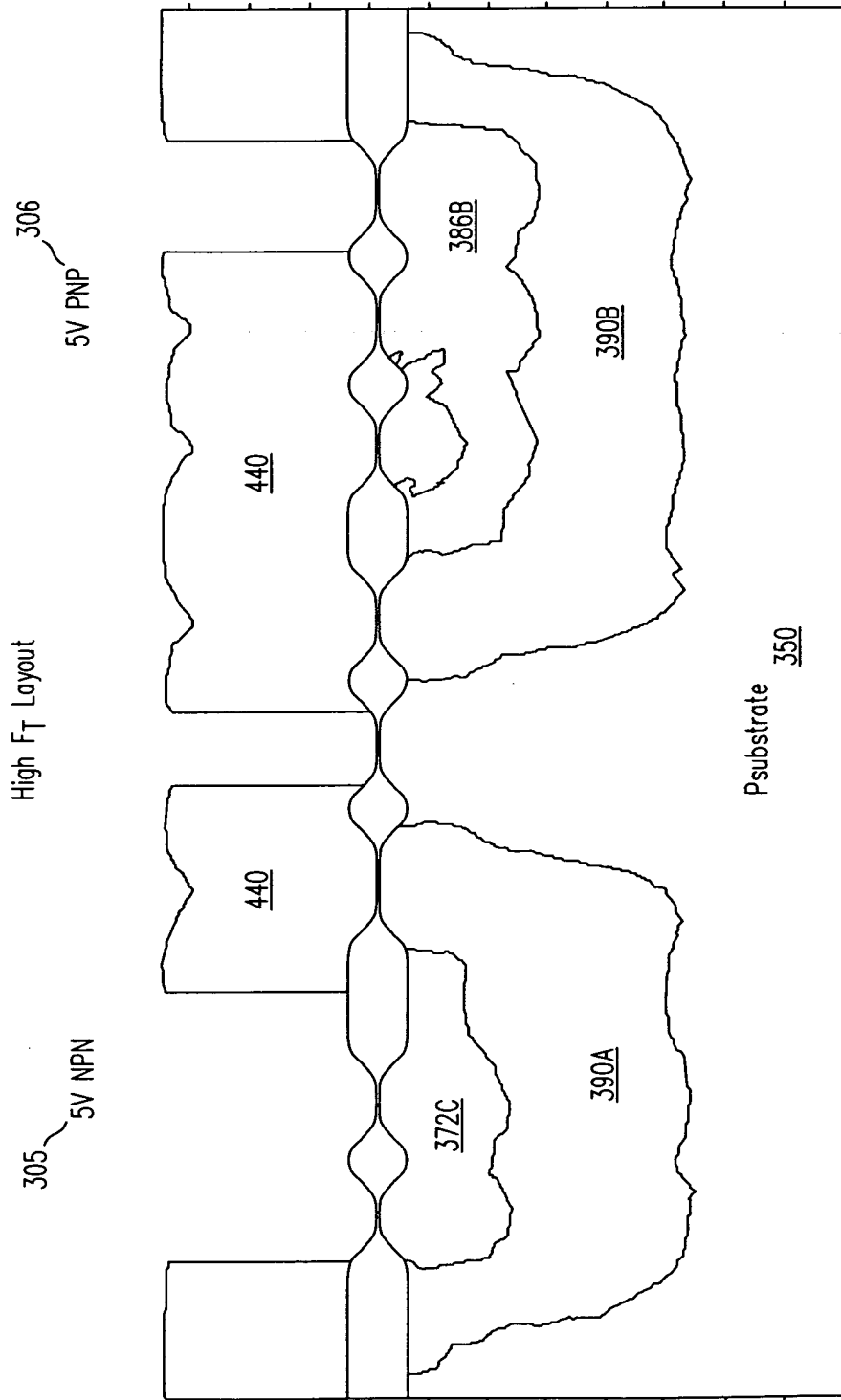


12V P Well Implant-Second Stage
FIG. 44E



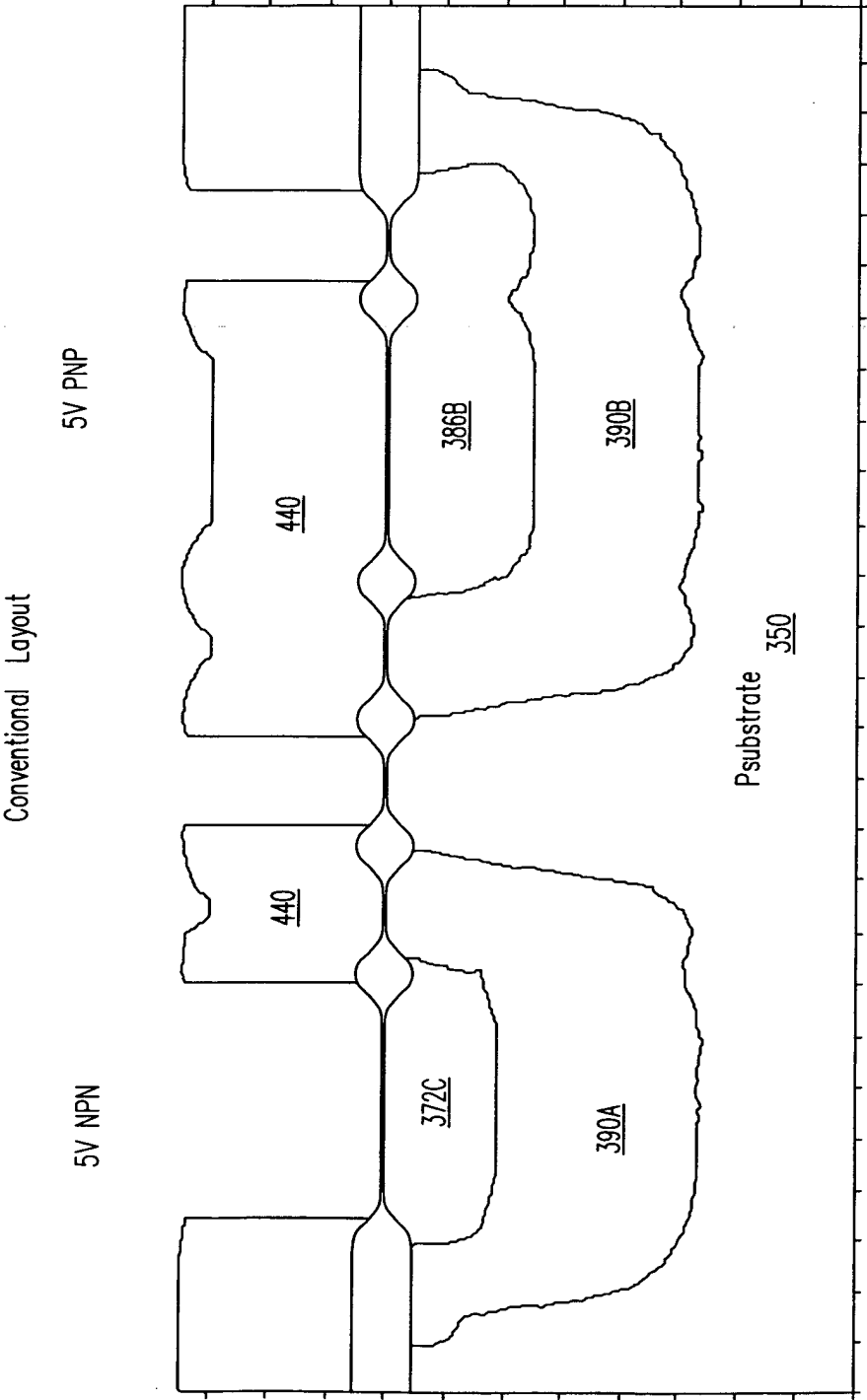
5V P Well Implant-First Stage

FIG. 45A



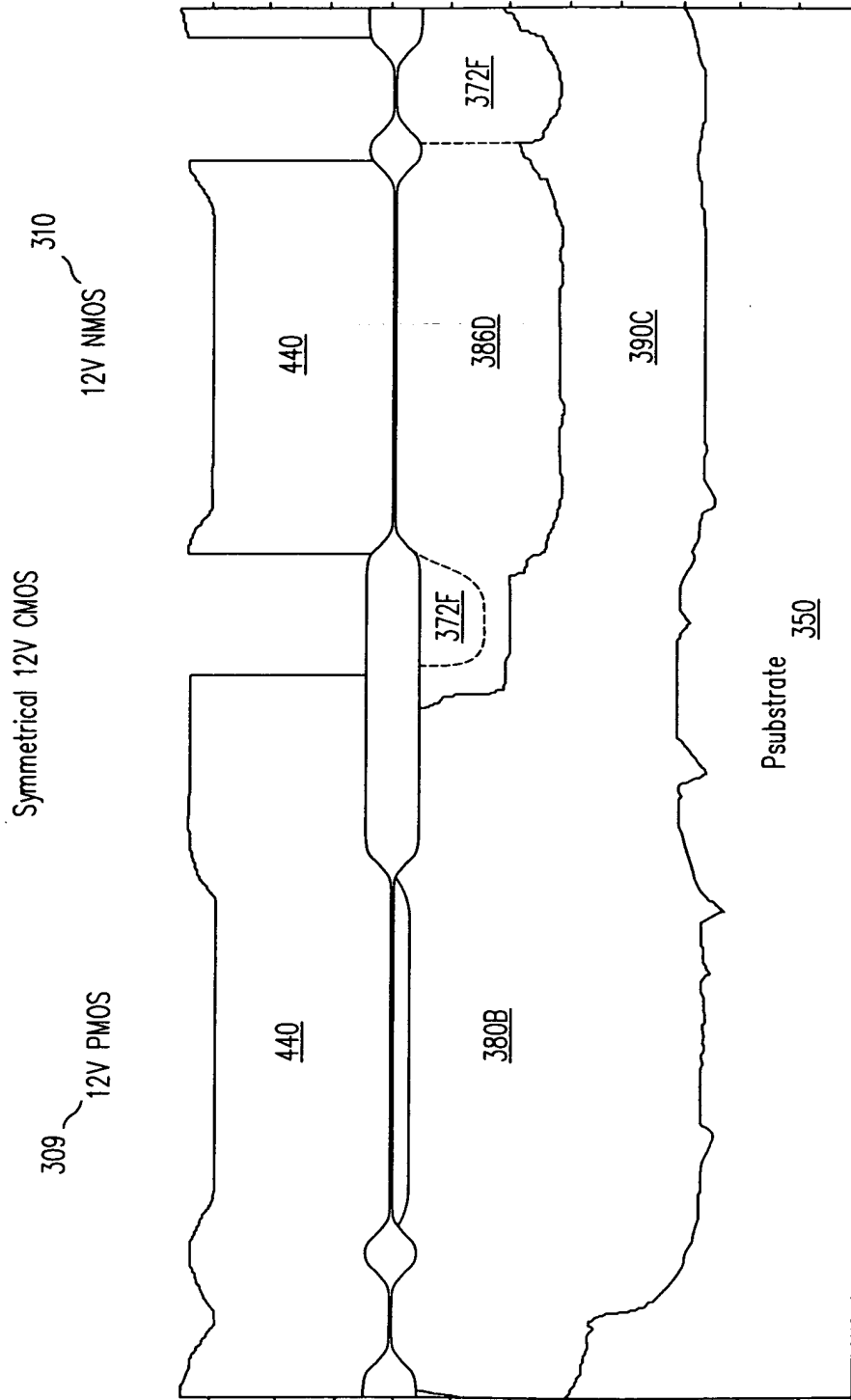
5V P Well Implant-First Stage

FIG. 45B



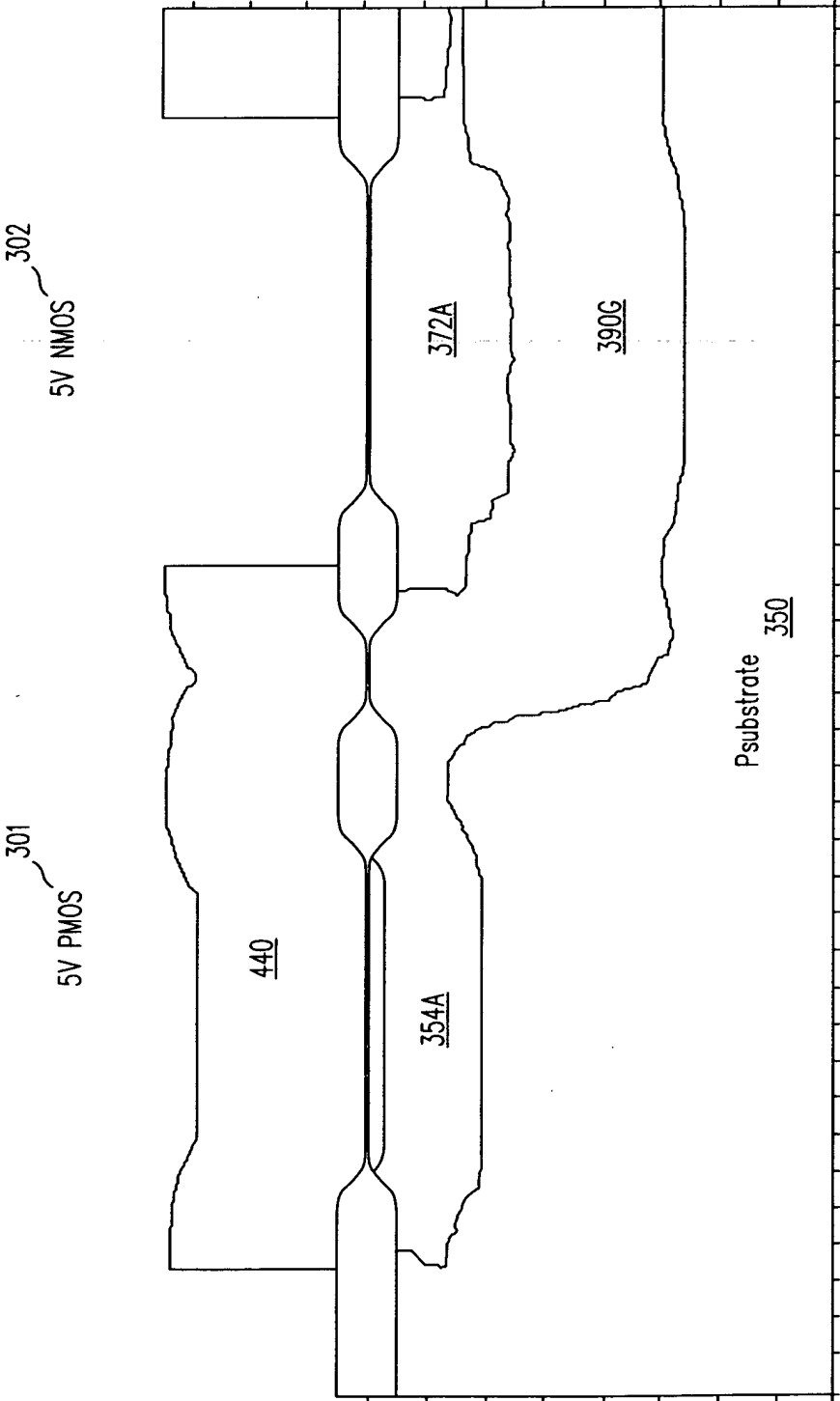
5V P Well Implant-First Stage

FIG. 45C



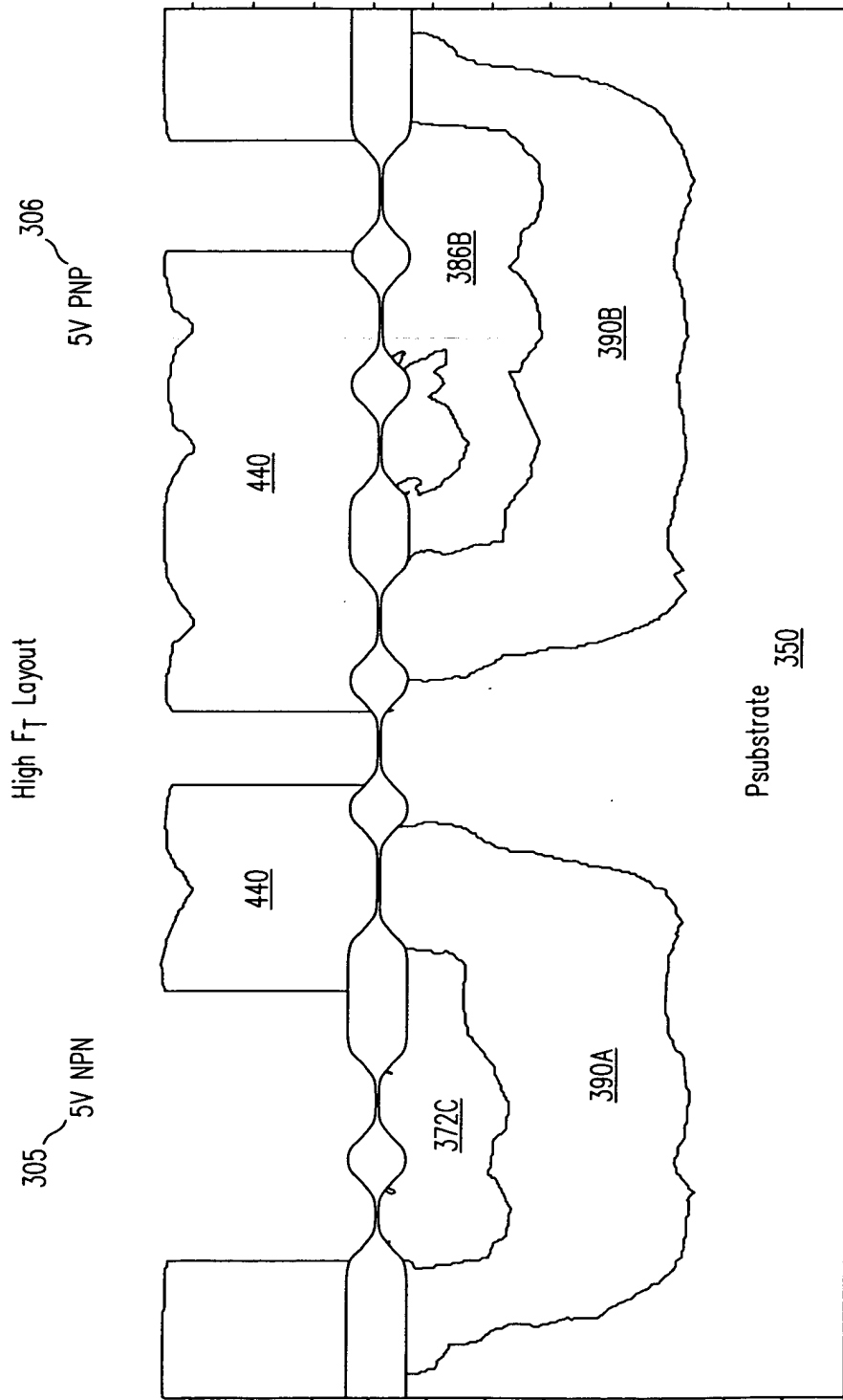
5V P Well Implant-First Stage

FIG. 45E



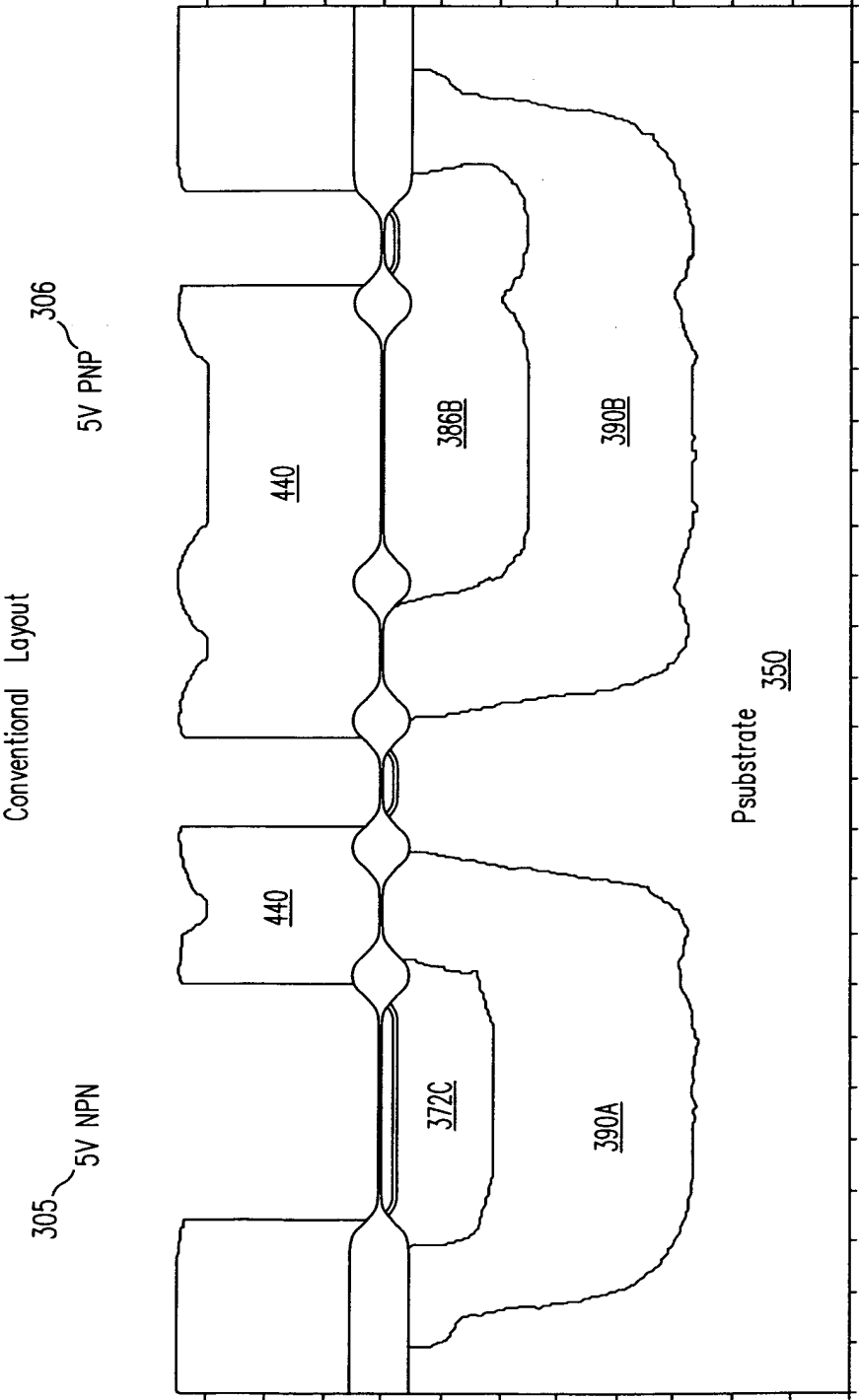
5V P Well Implant-Second Stage

FIG. 46A



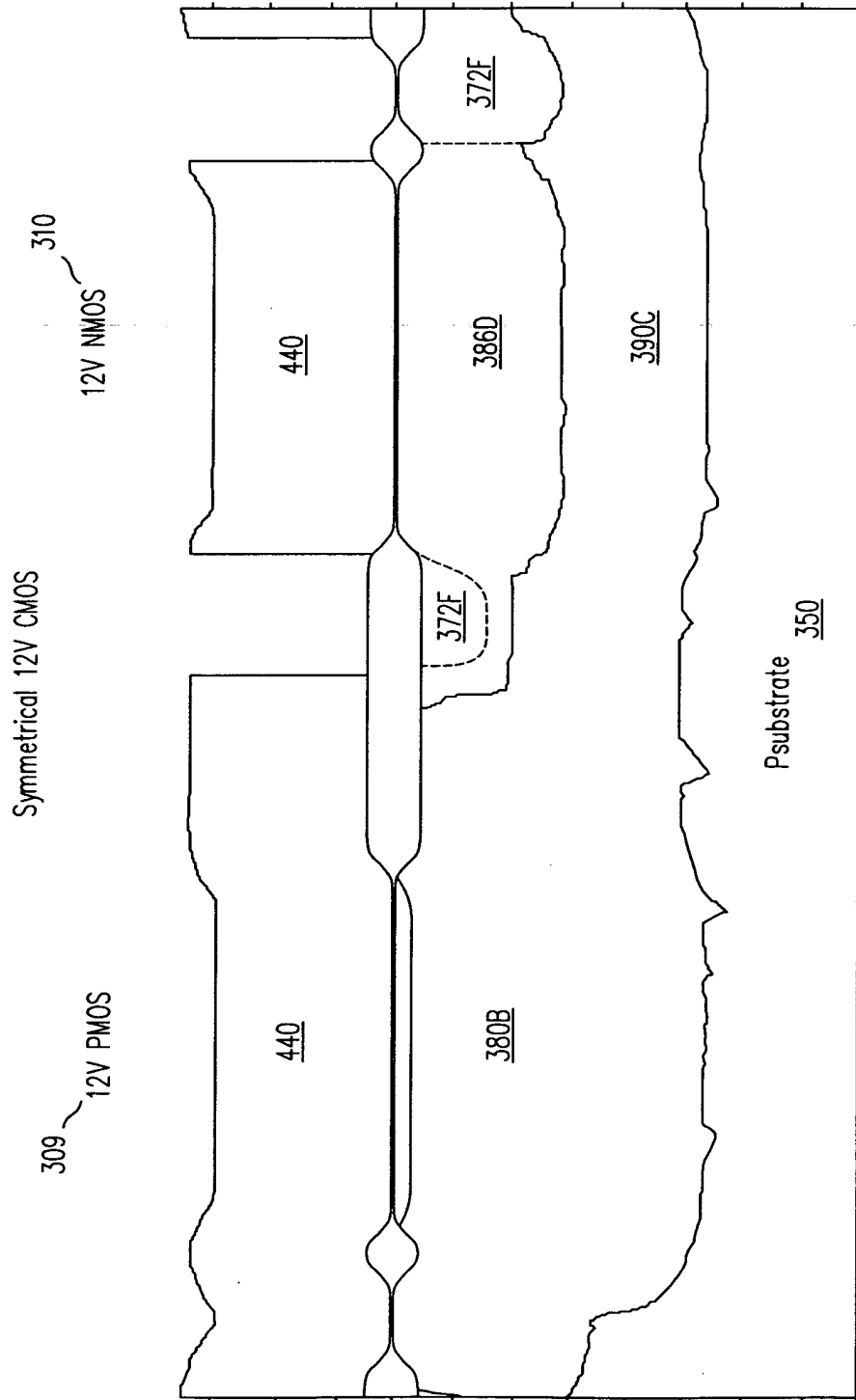
5V P Well Implant-Second Stage

FIG. 46B



5V P Well Implant-Second Stage

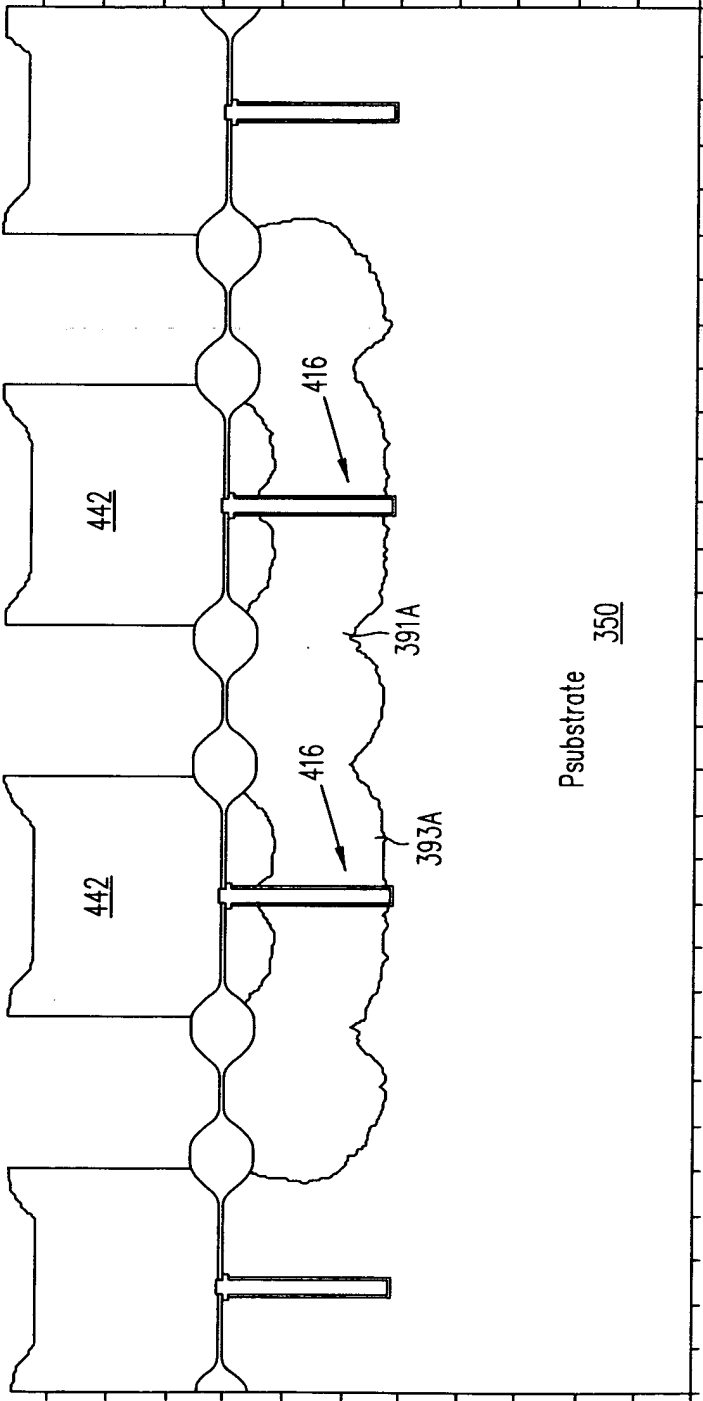
FIG. 46C



5V P Well Implant—Second Stage

FIG. 46E

30V Lateral Trench DMOS ~ 308



Etch-Block Mask and Etching of Planar Active Regions

FIG. 47D

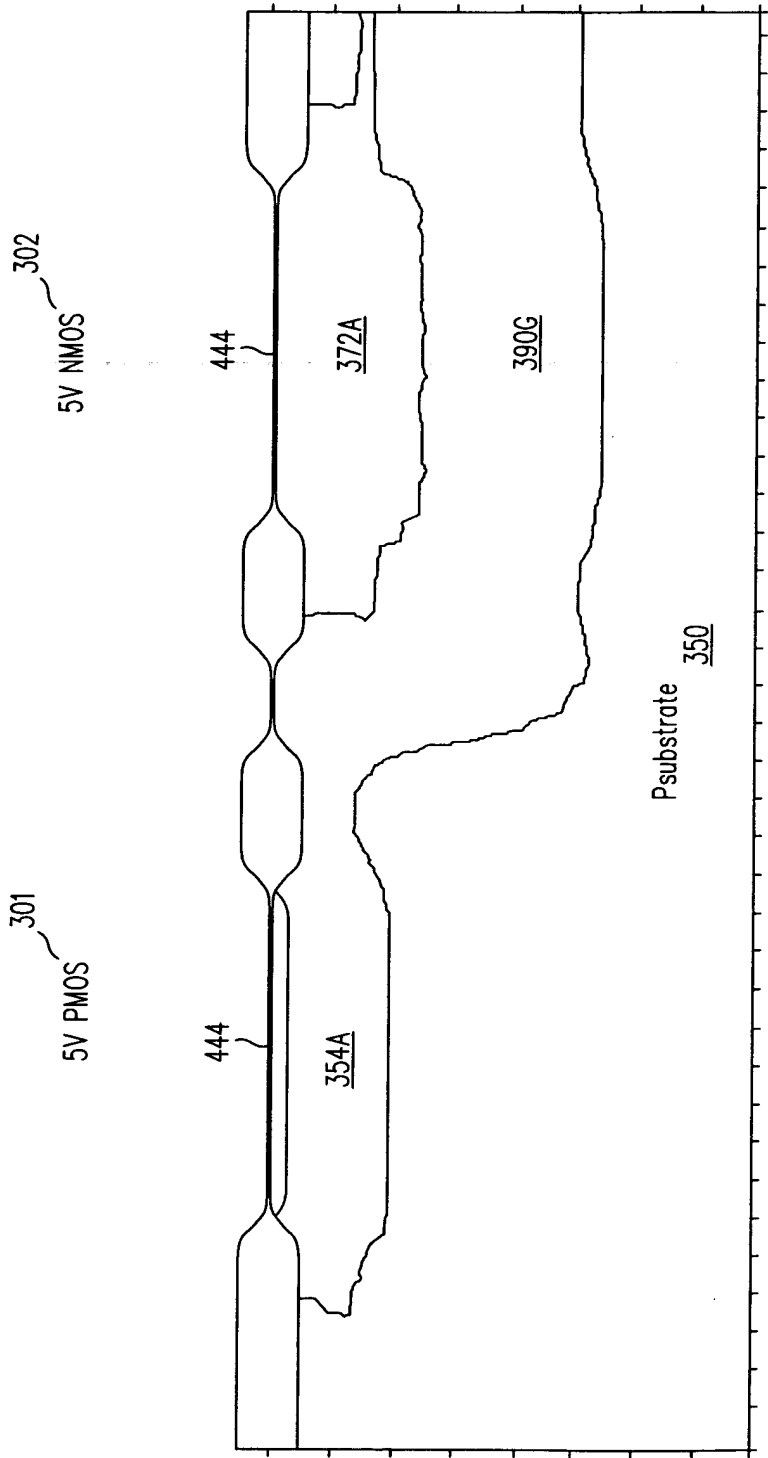
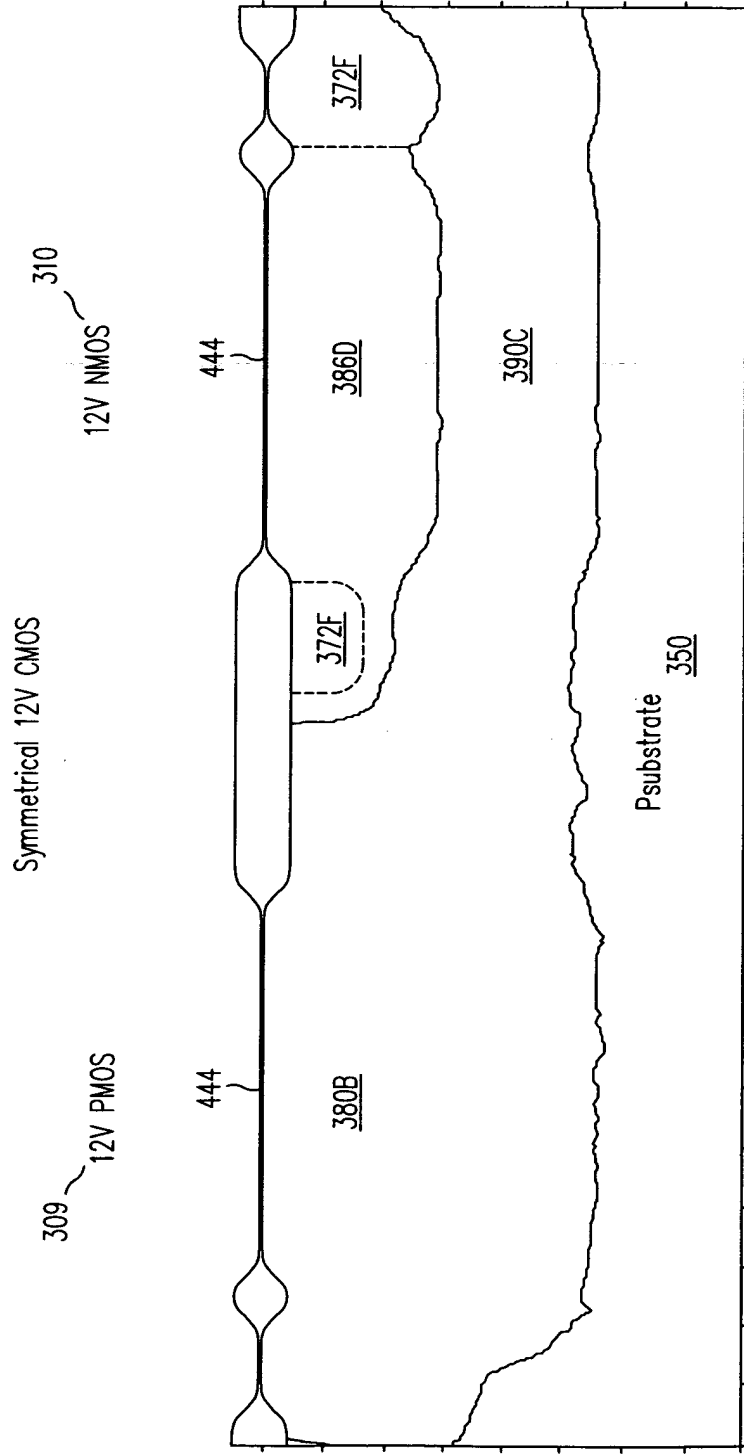
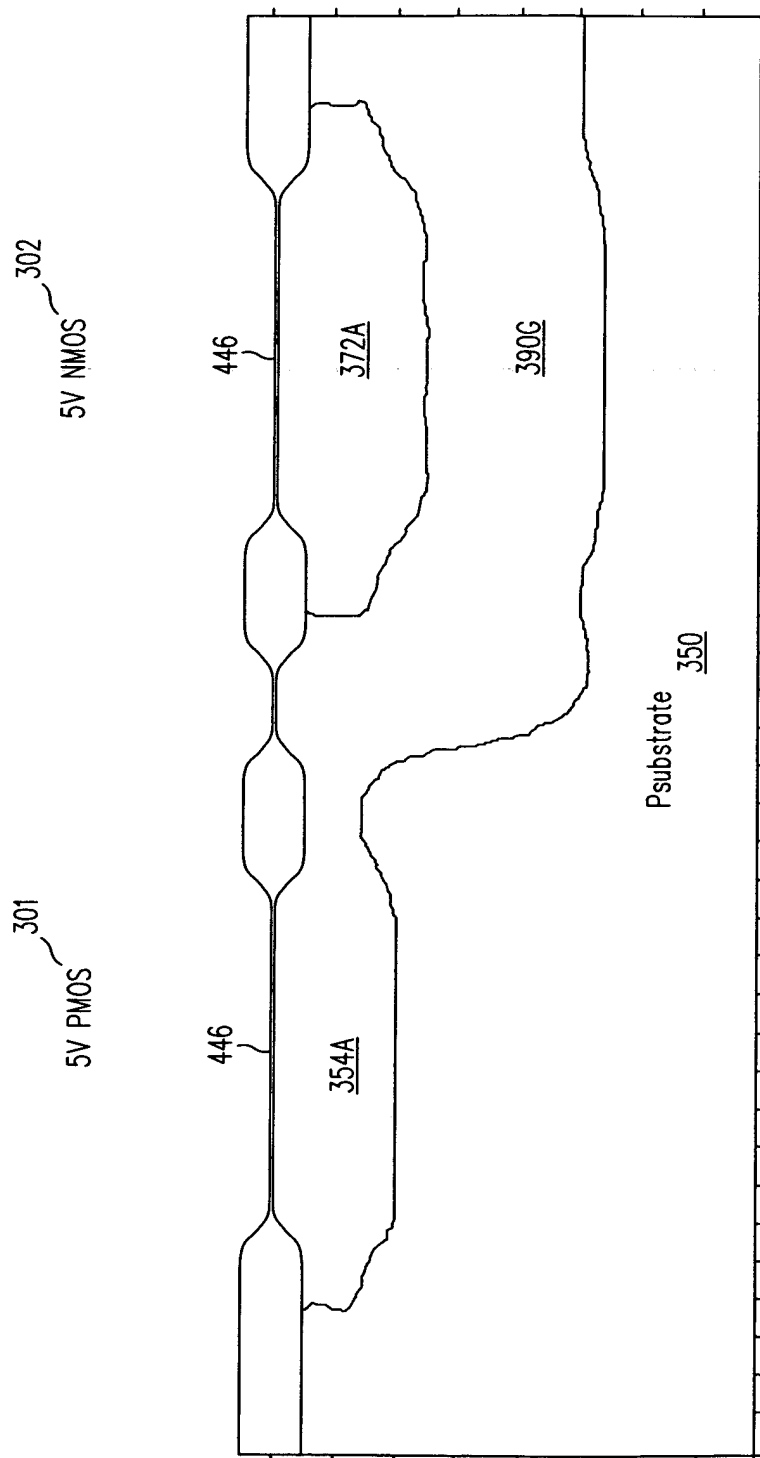


FIG. 48A



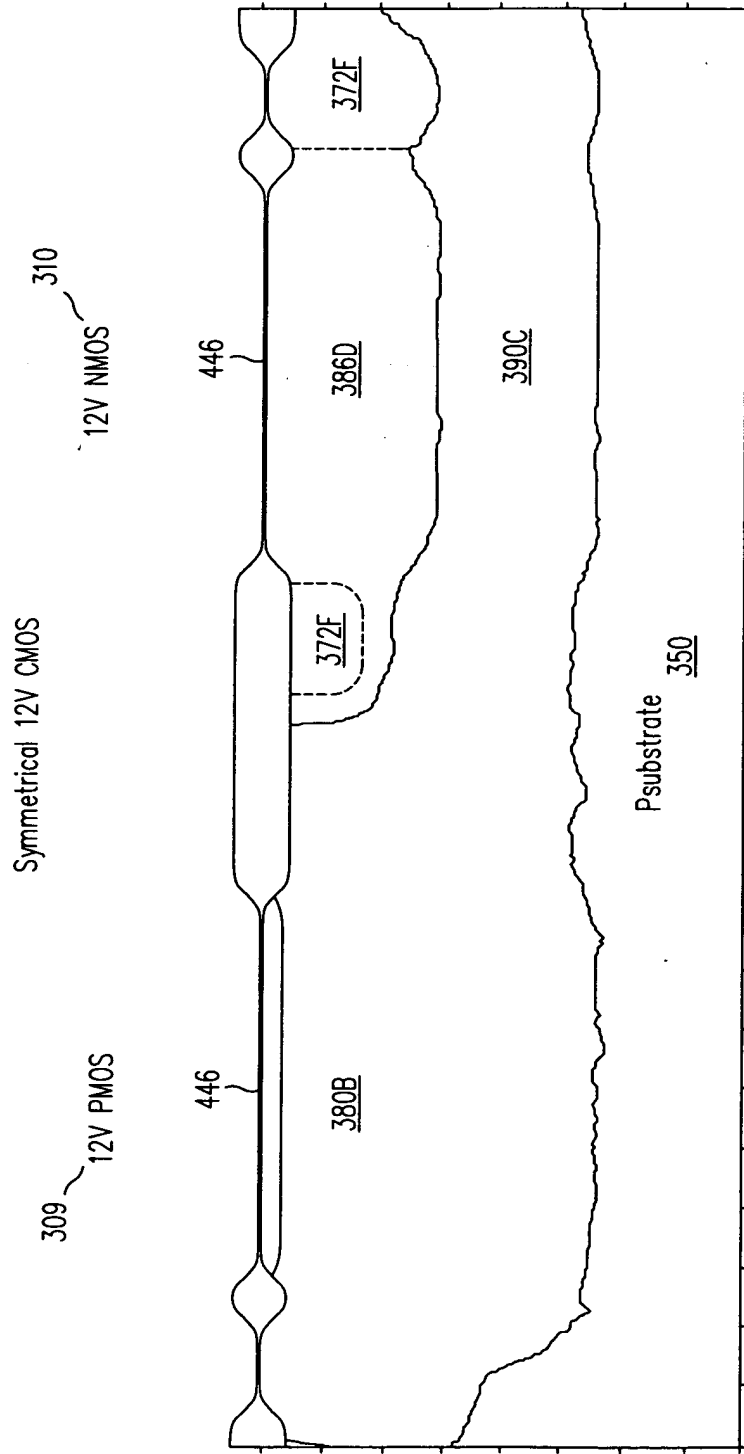
First Planar Gate Oxide

FIG. 48E



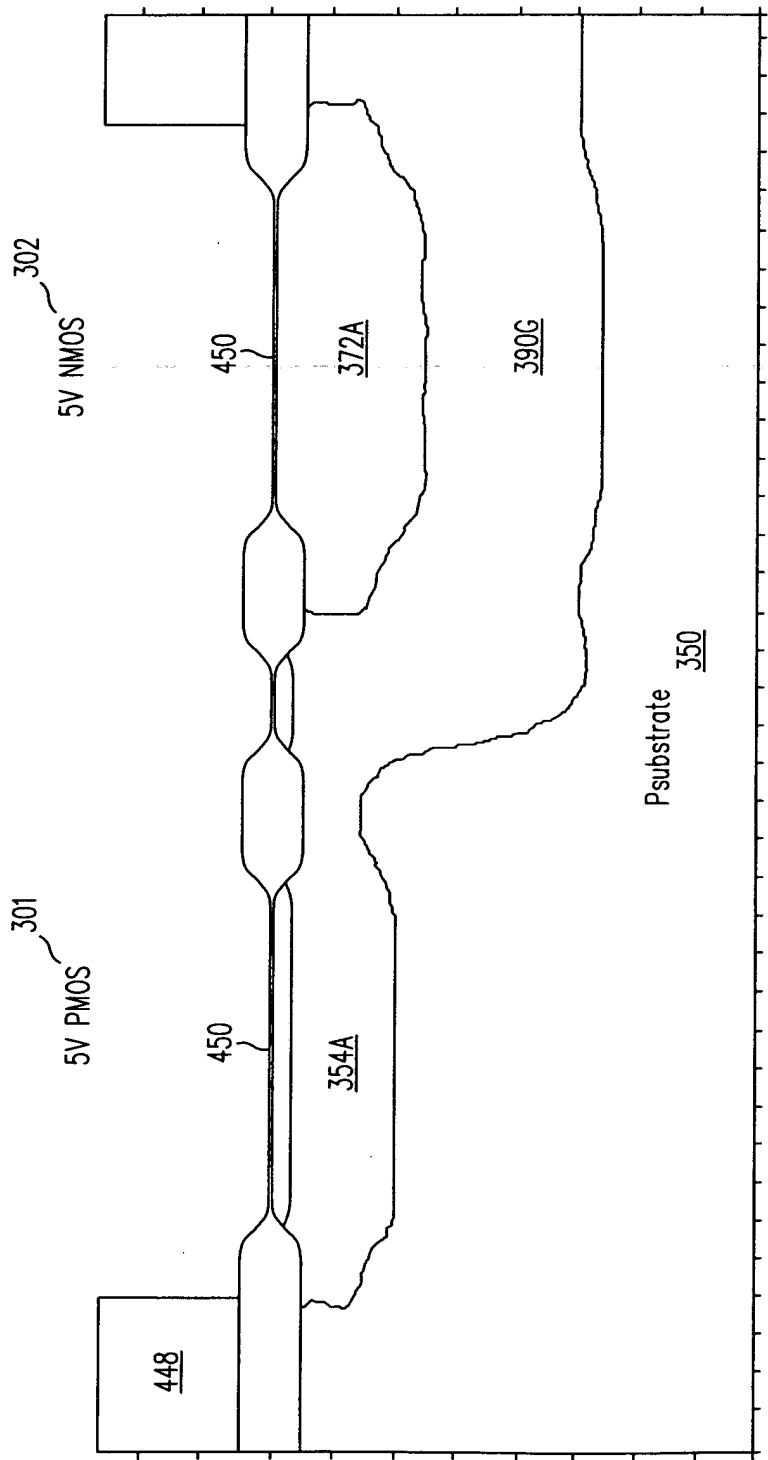
Threshold Adjust Implant—First Stage

FIG. 49A



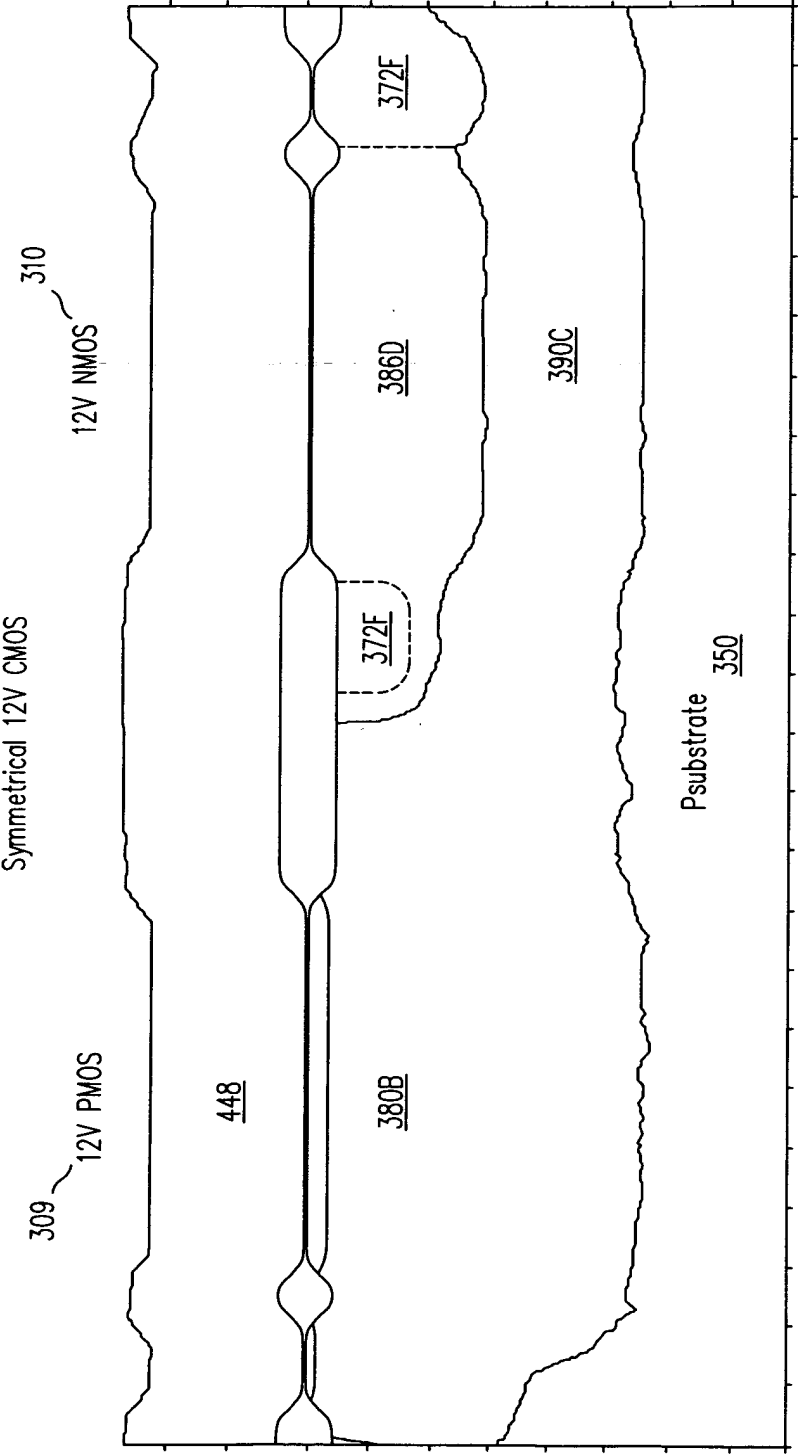
Threshold Adjust Implant—First Stage

FIG. 49E



Threshold Adjust Implant—Second Stage
First Planar Gate Oxide Removal

FIG. 50A



Threshold Adjust Implant-Second Stage

FIG. 50E

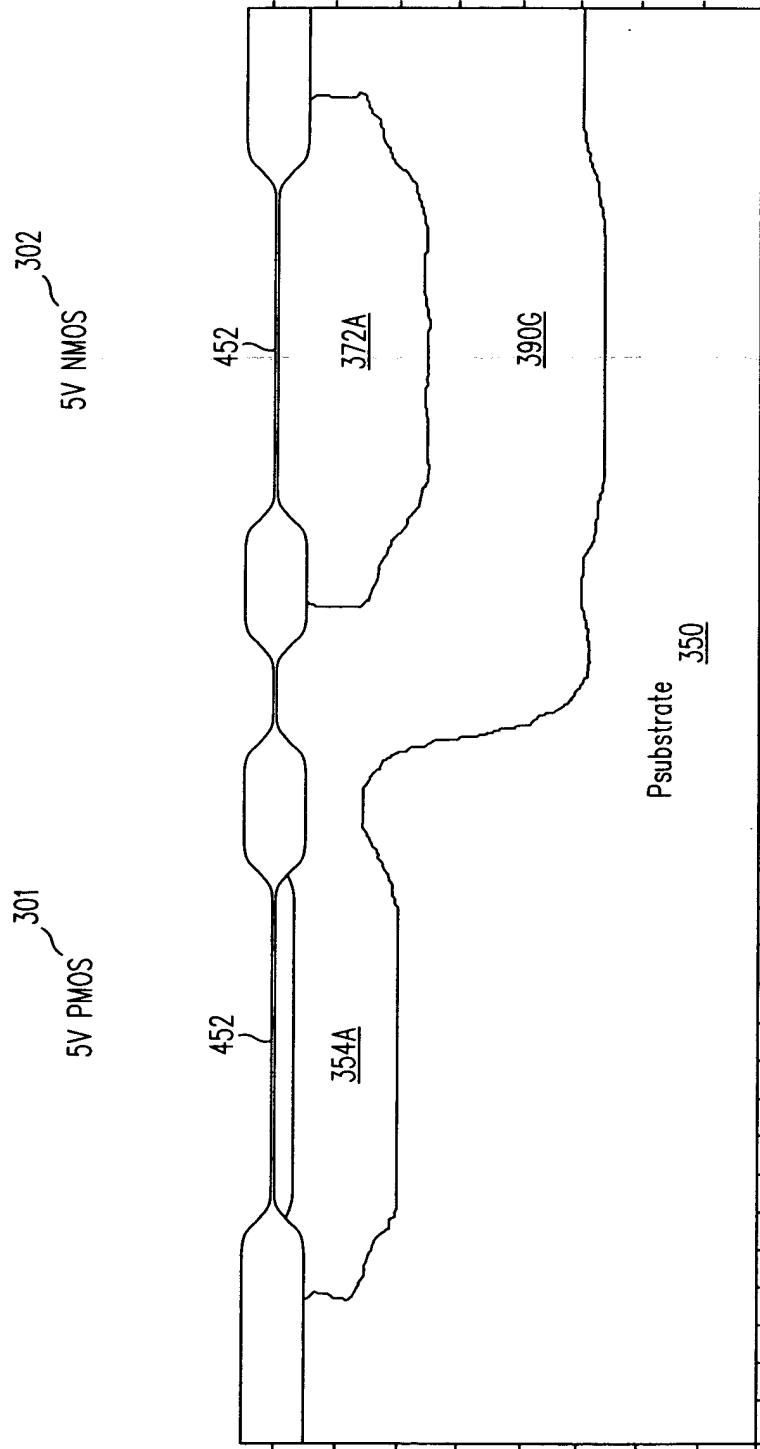
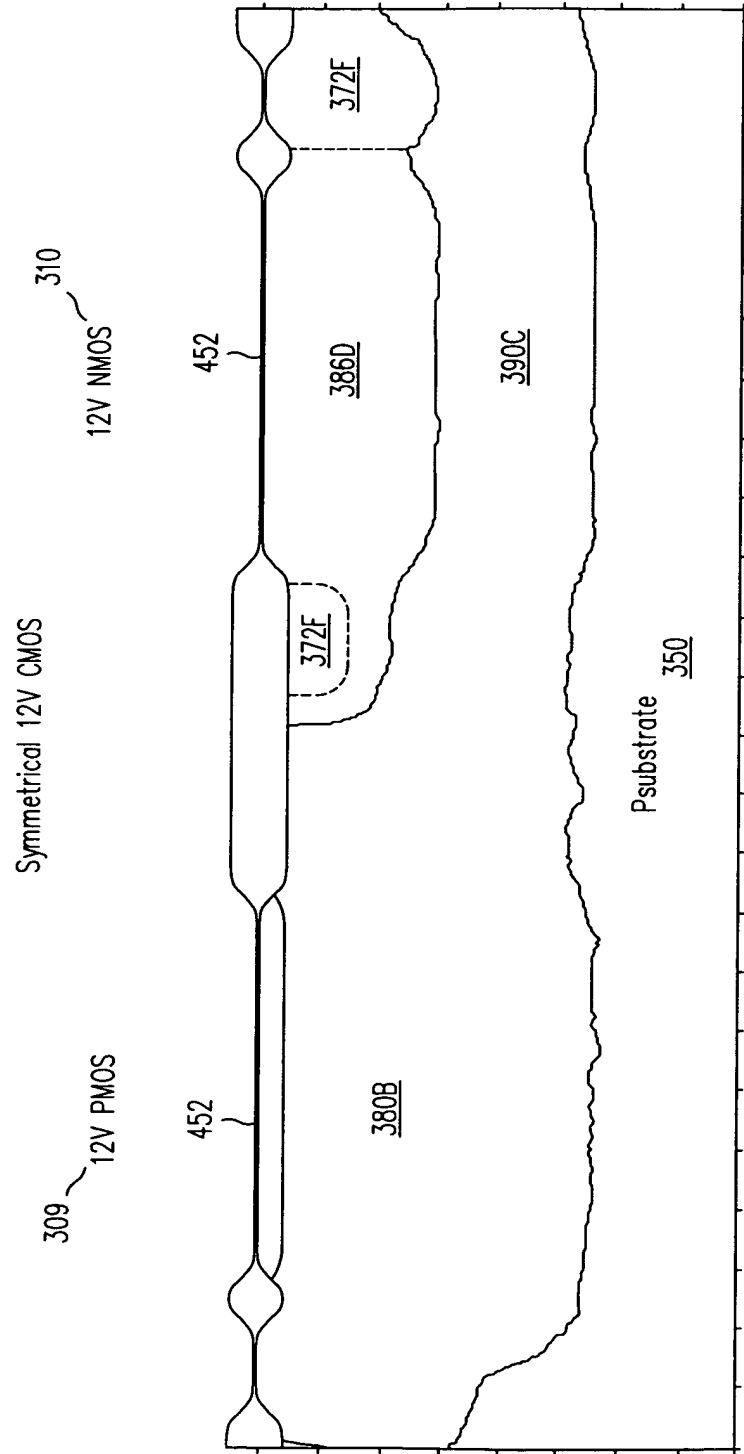


FIG. 51A



Second Planar Gate Oxide

FIG. 51E

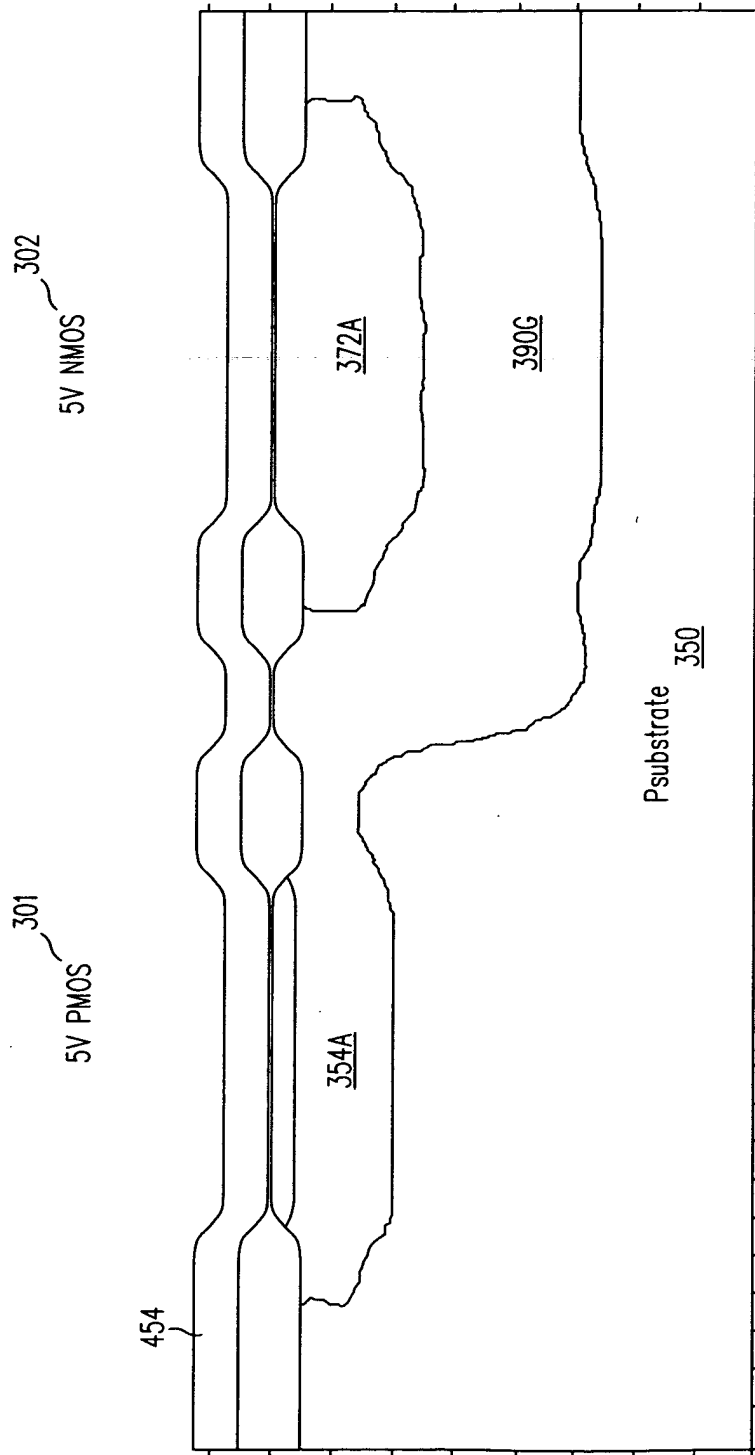
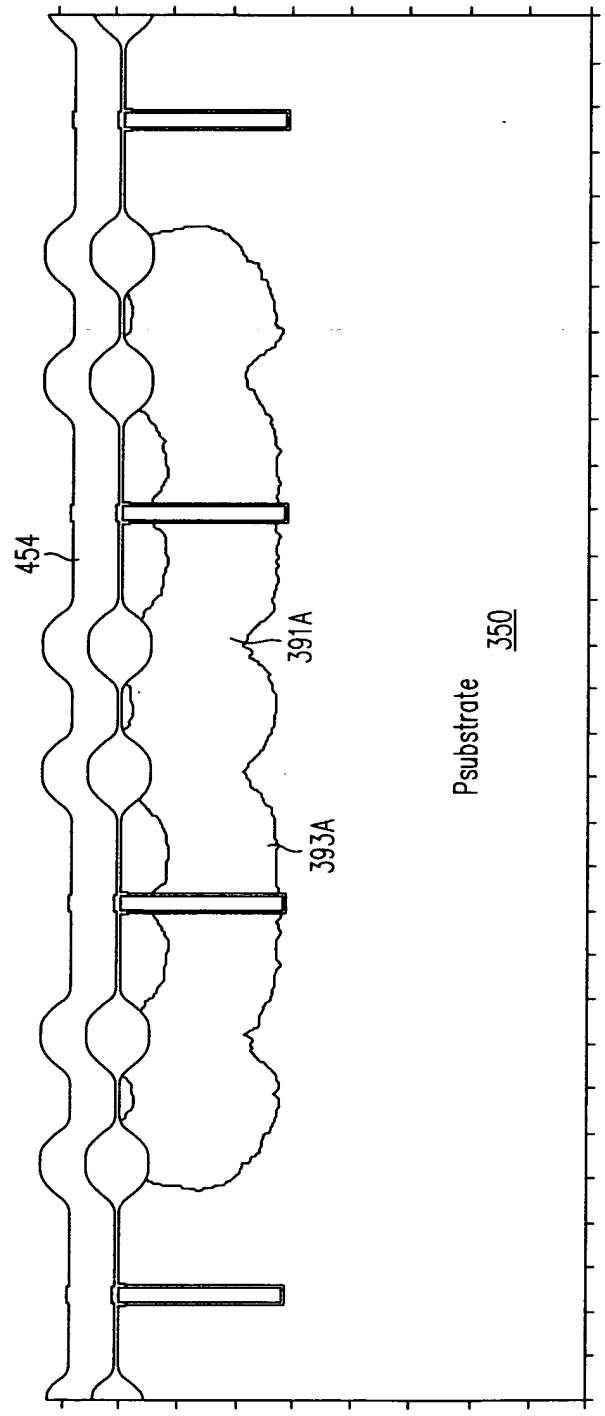


FIG. 52A

30V Lateral Trench DMOS ~ 308



Polysilicon-Third Layer

FIG. 52D

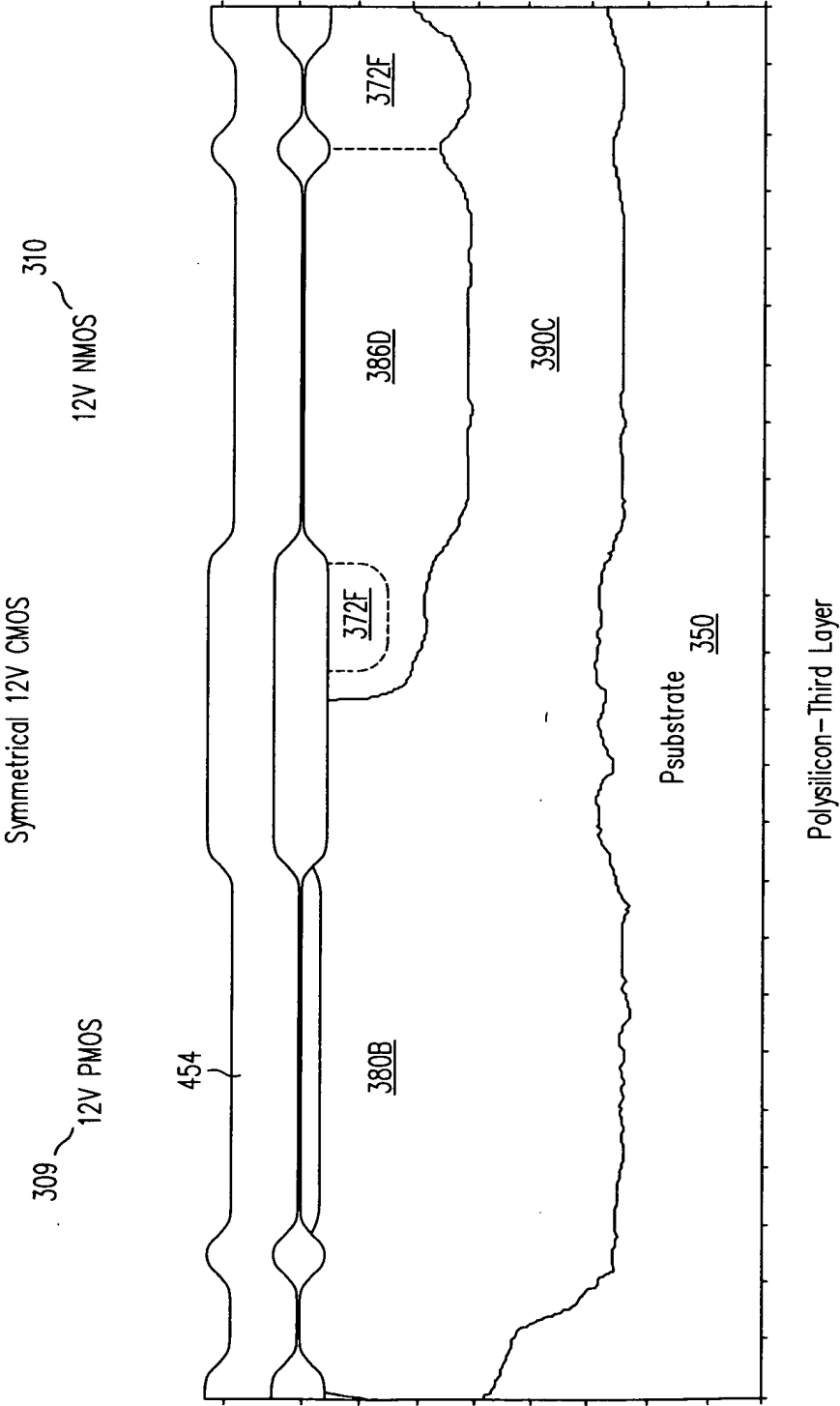
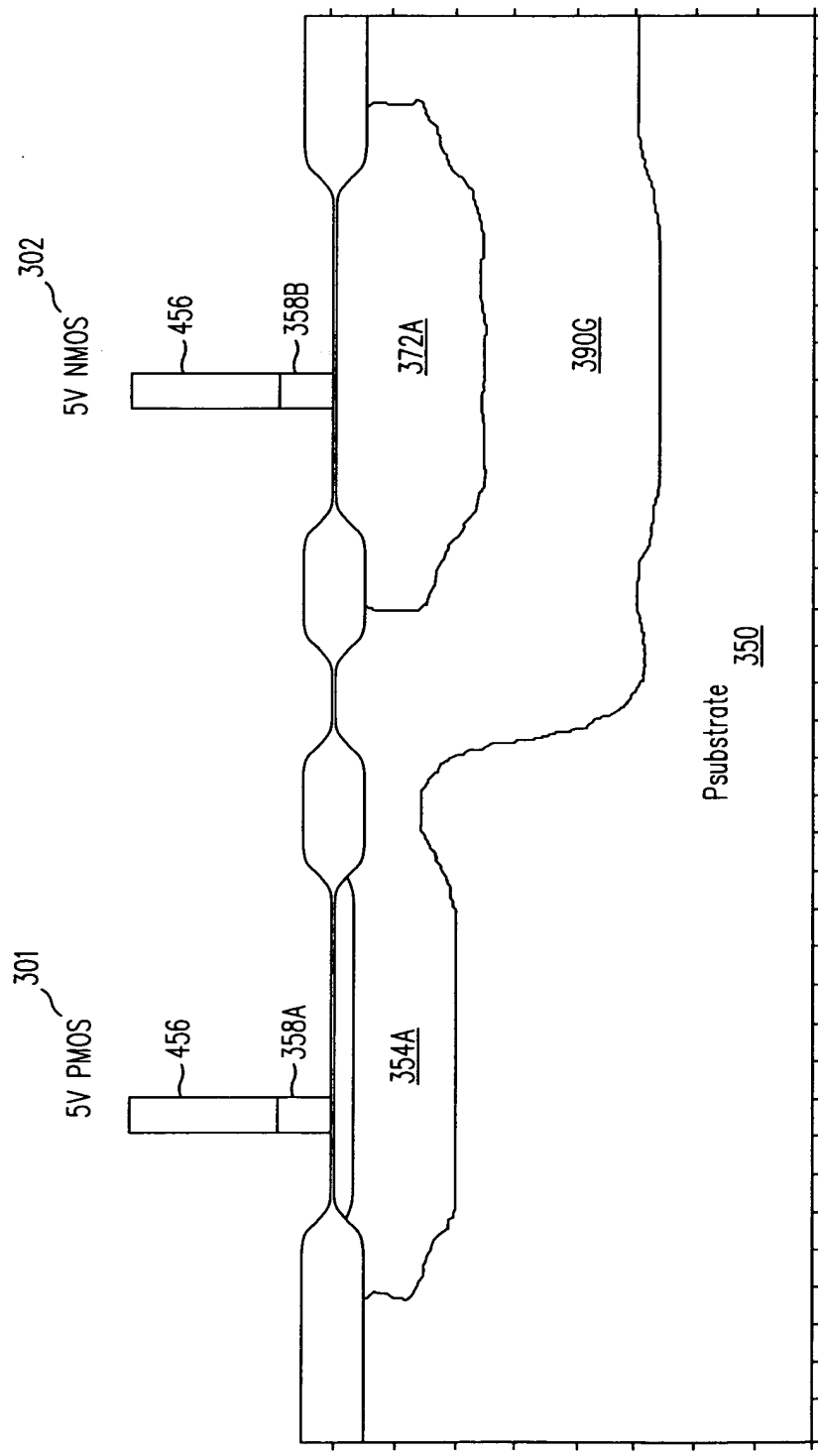


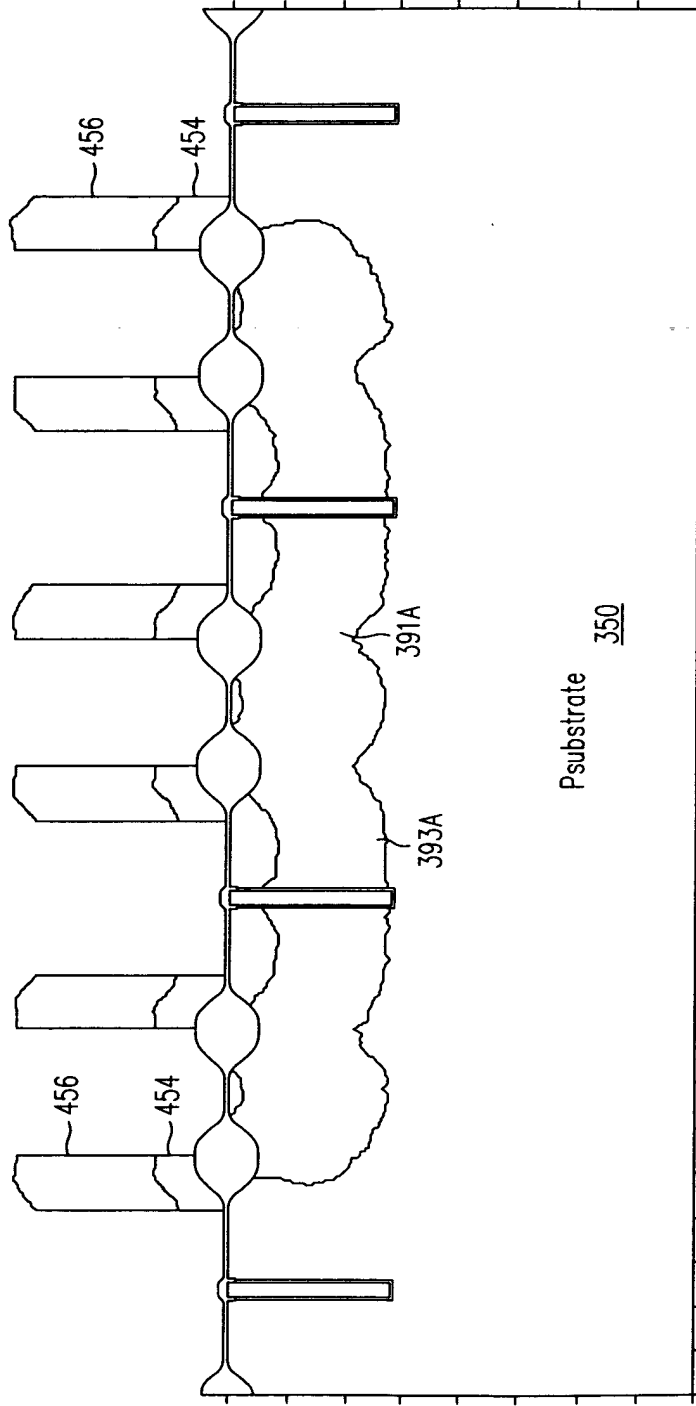
FIG. 52E



Planar Gate Formation

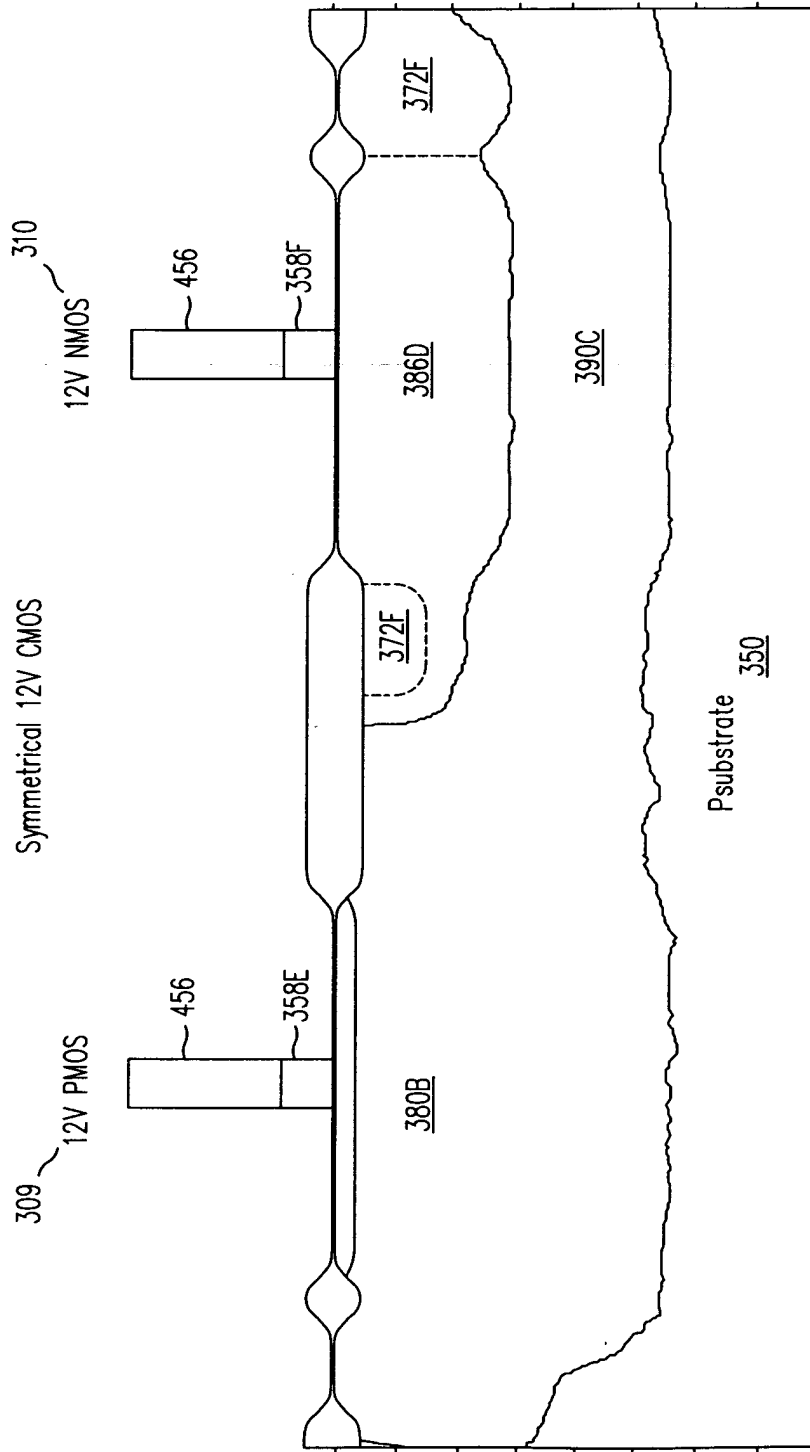
FIG. 53A

30V Lateral Trench DMOS — 308



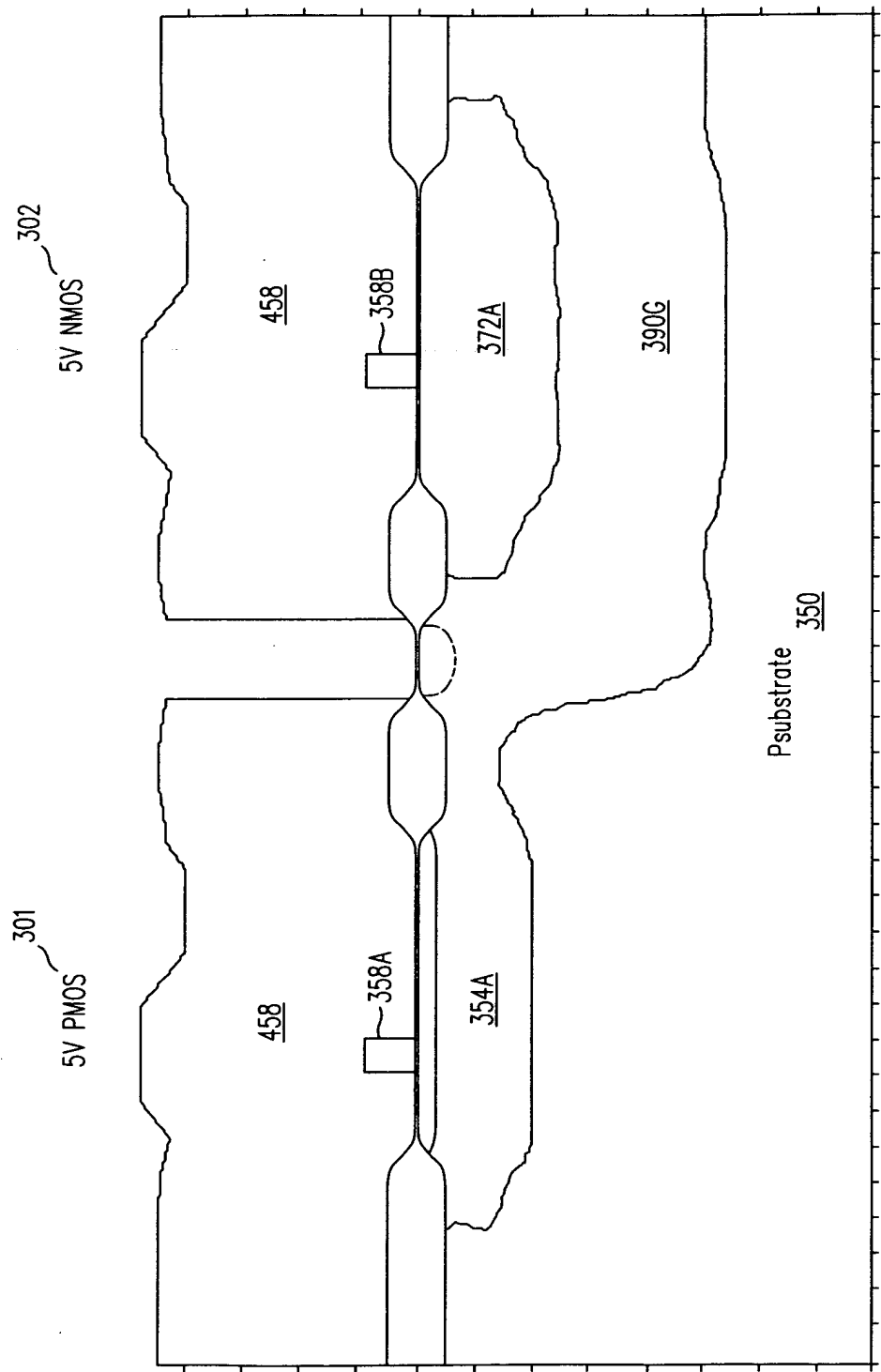
Planar Gate Formation

FIG. 53D



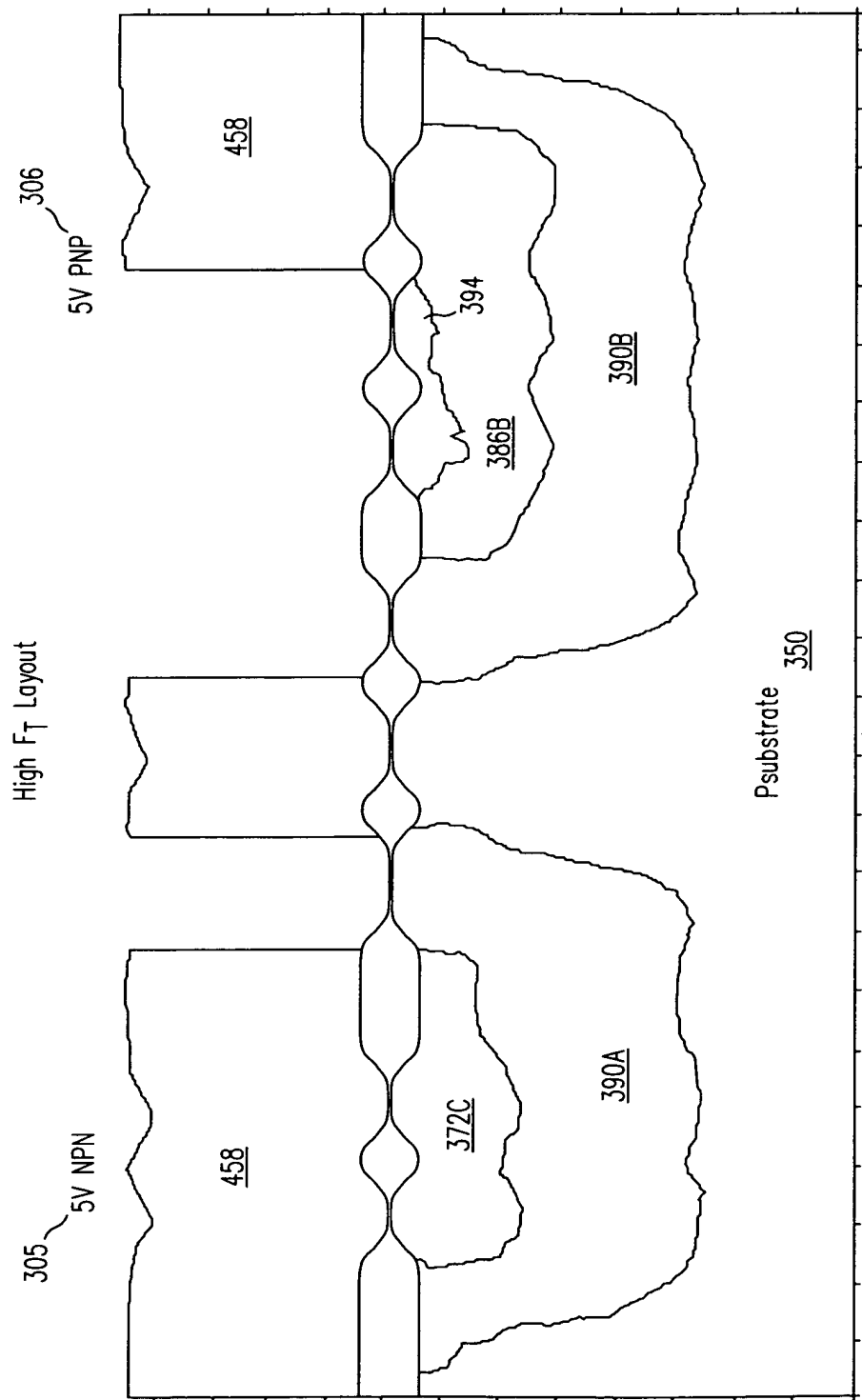
Planar Gate Formation

FIG. 53E



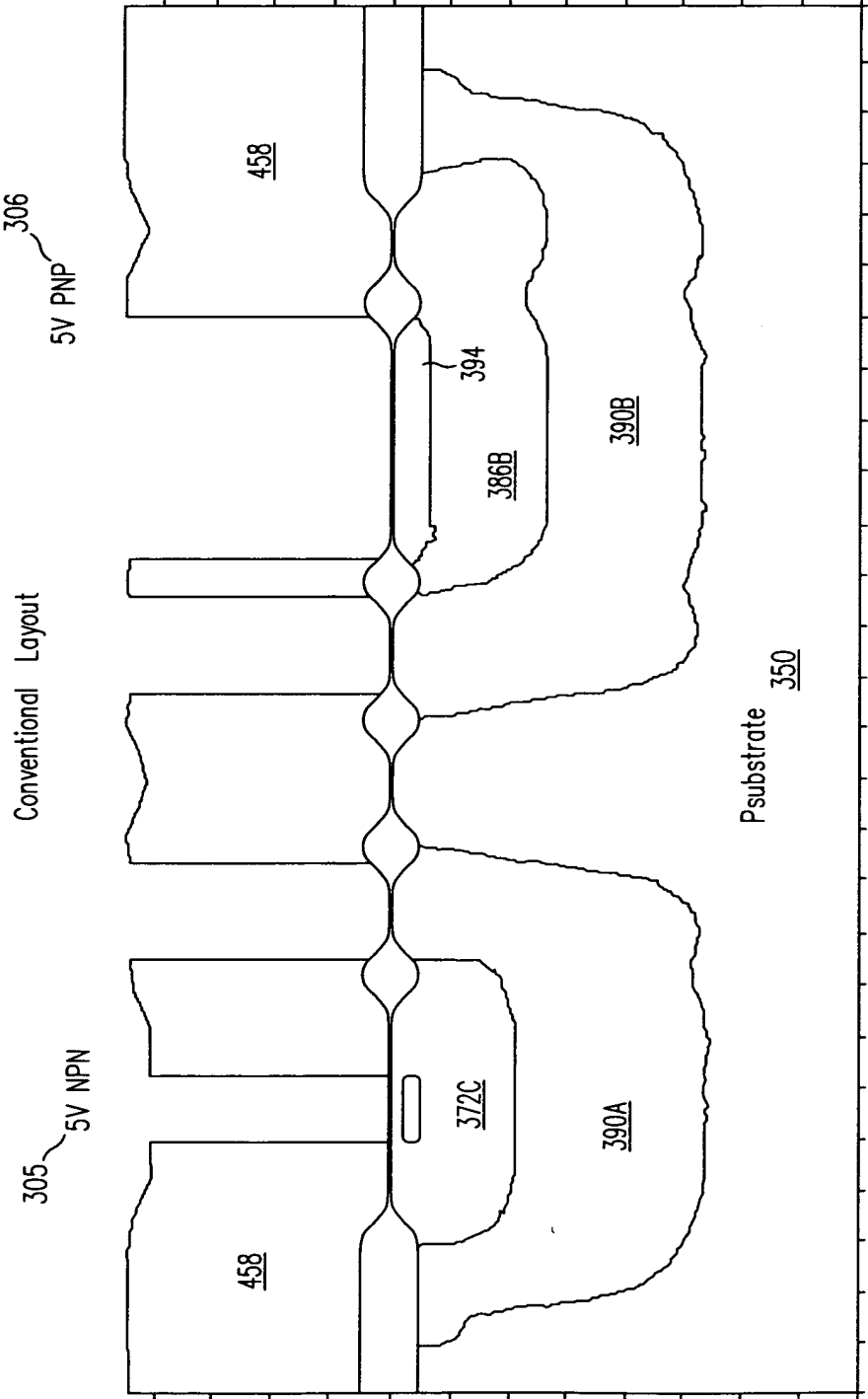
N-Base Mask and Implant

FIG. 54A



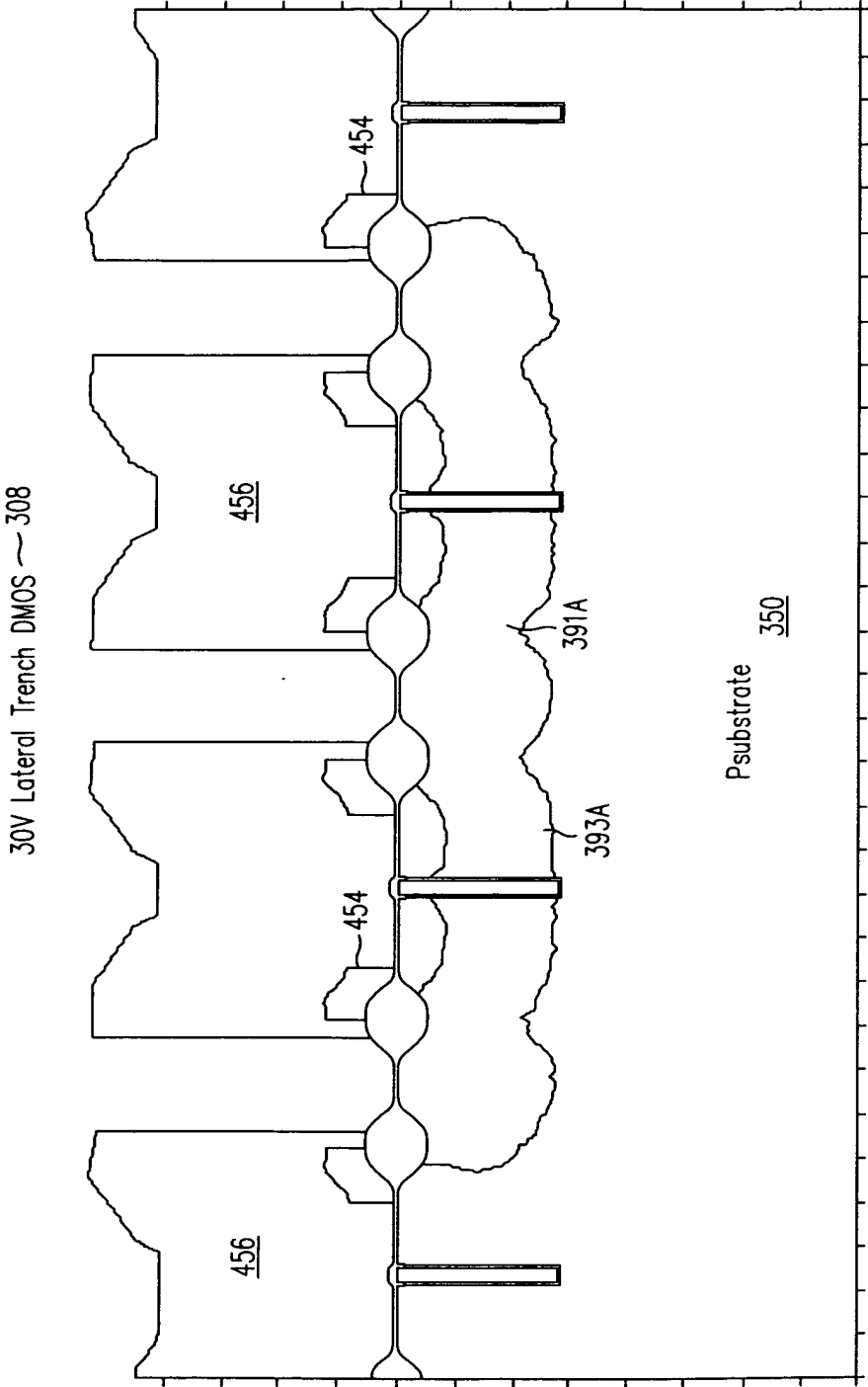
N-Base Mask and Implant

FIG. 54B



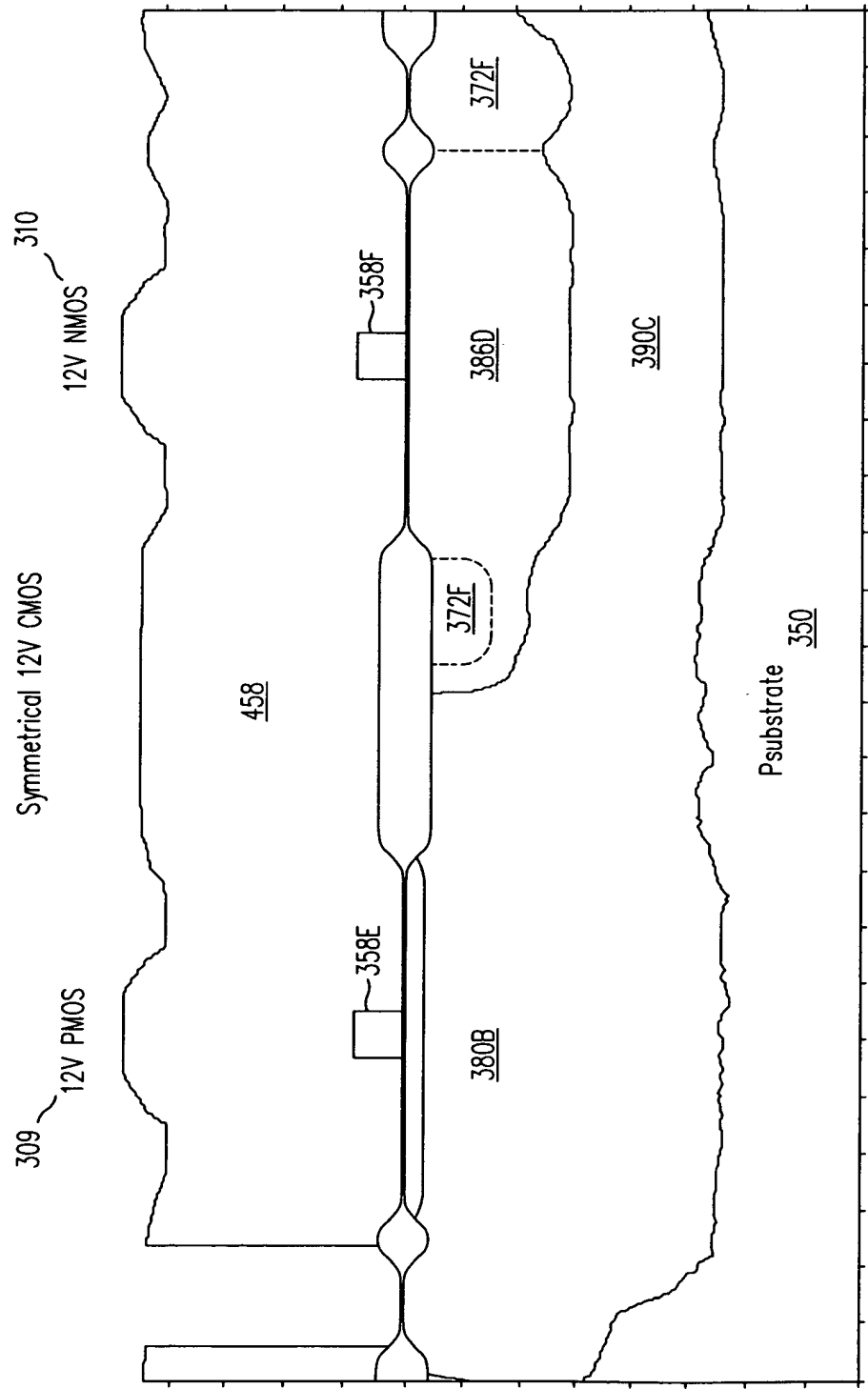
N-Base Mask and Implant

FIG. 54C



N-Base Mask and Implant

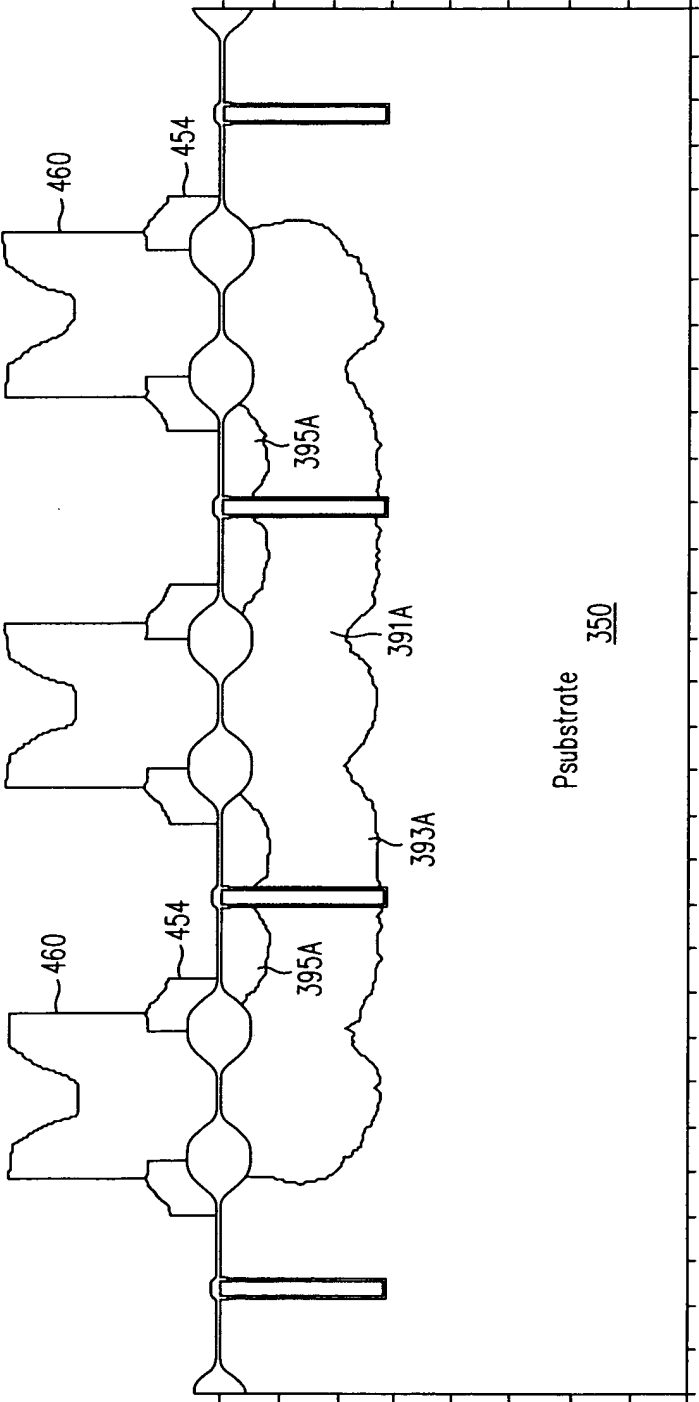
FIG. 54D



N-Base Mask and Implant

FIG. 54E

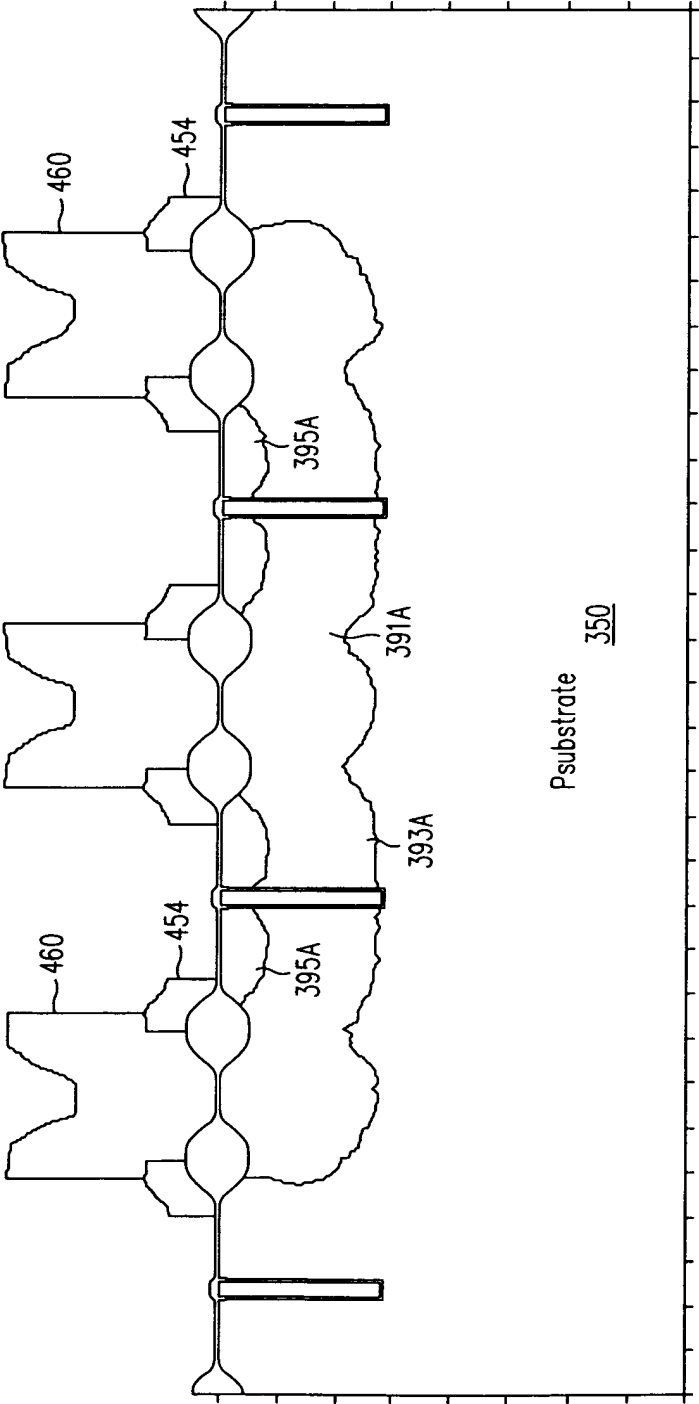
30V Lateral Trench DMOS ~ 308



P Body Mask and Implant-First Stage

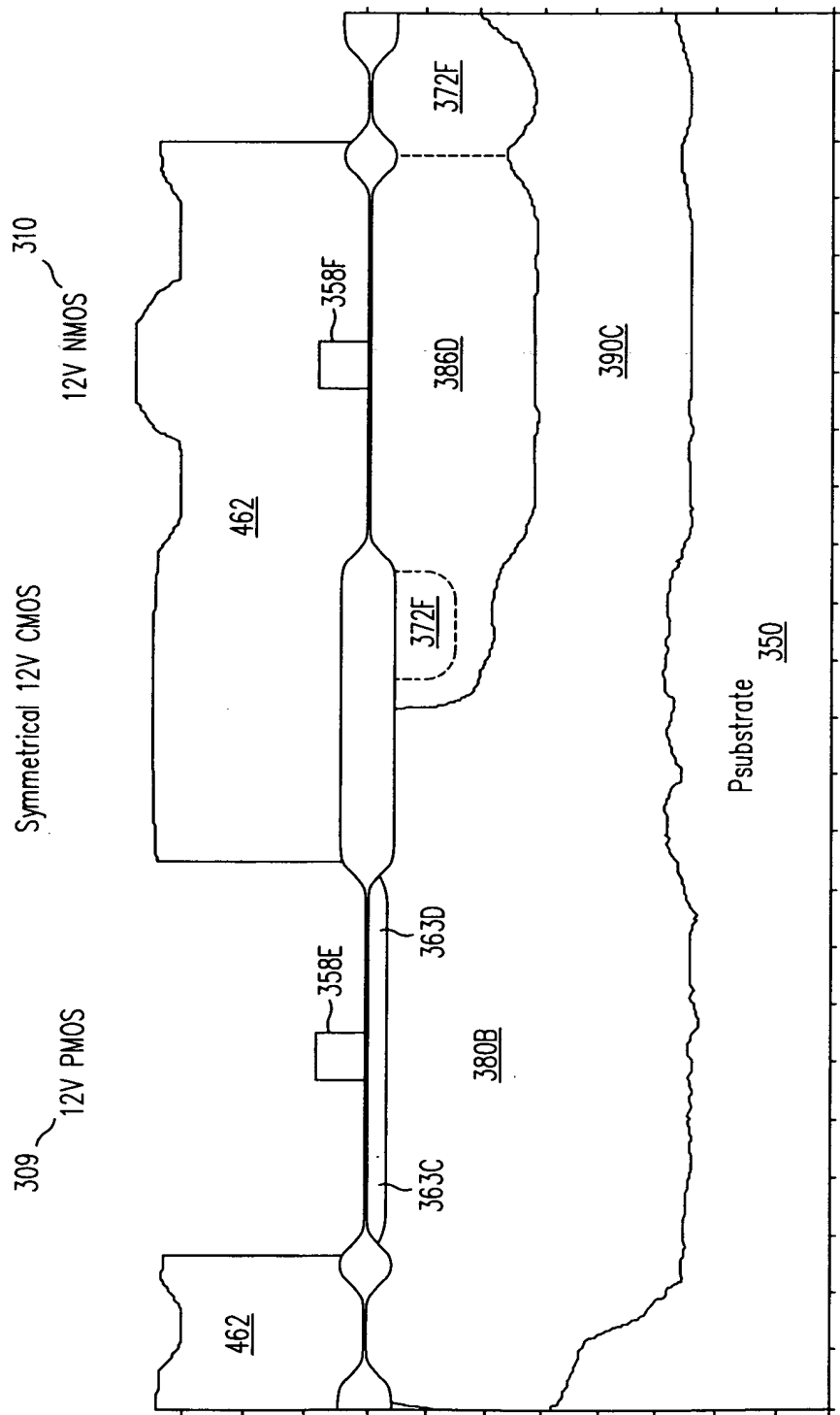
FIG. 55D

30V Lateral Trench DMOS ~ 308

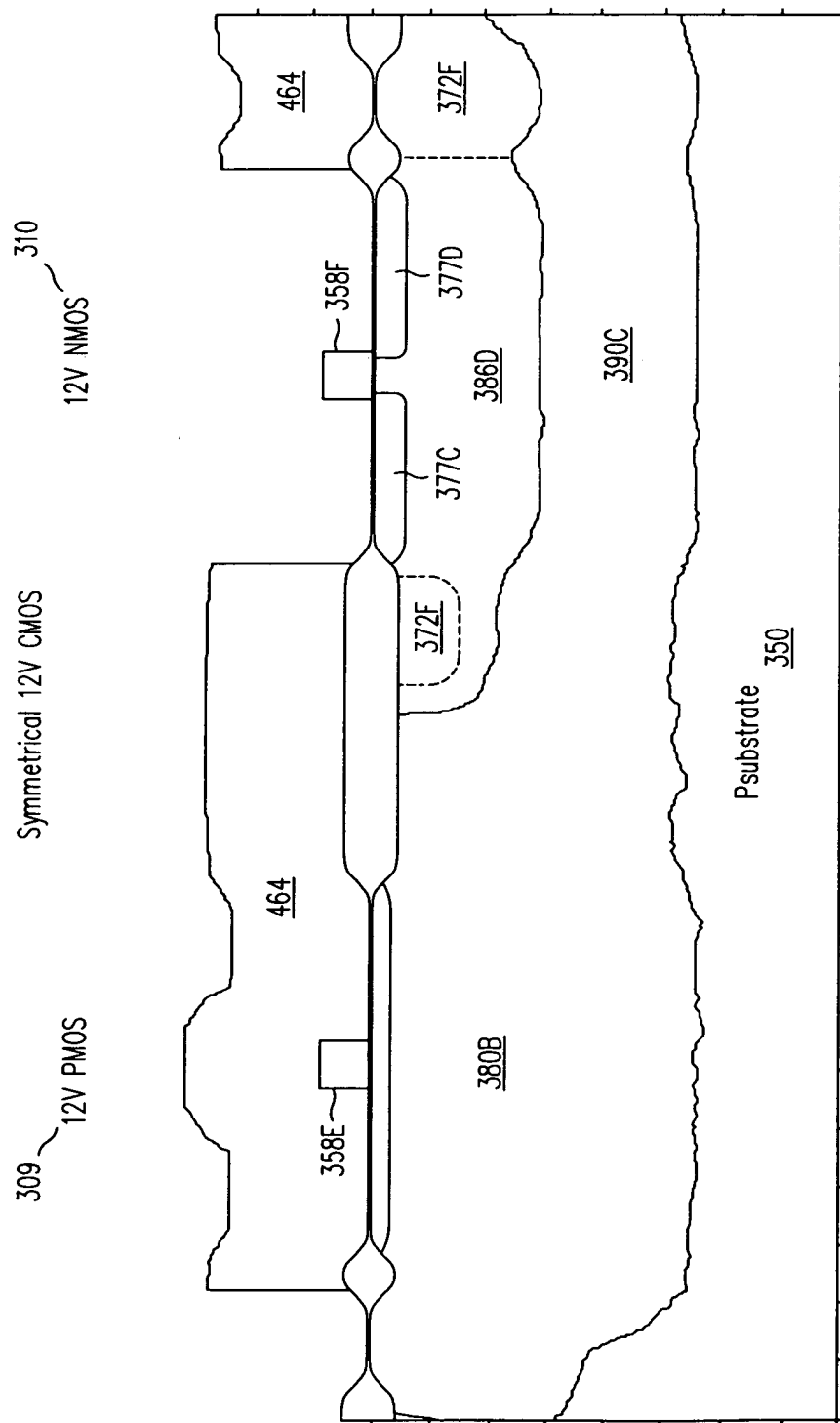


P Body Mask and Implant-Second Stage

FIG. 56D

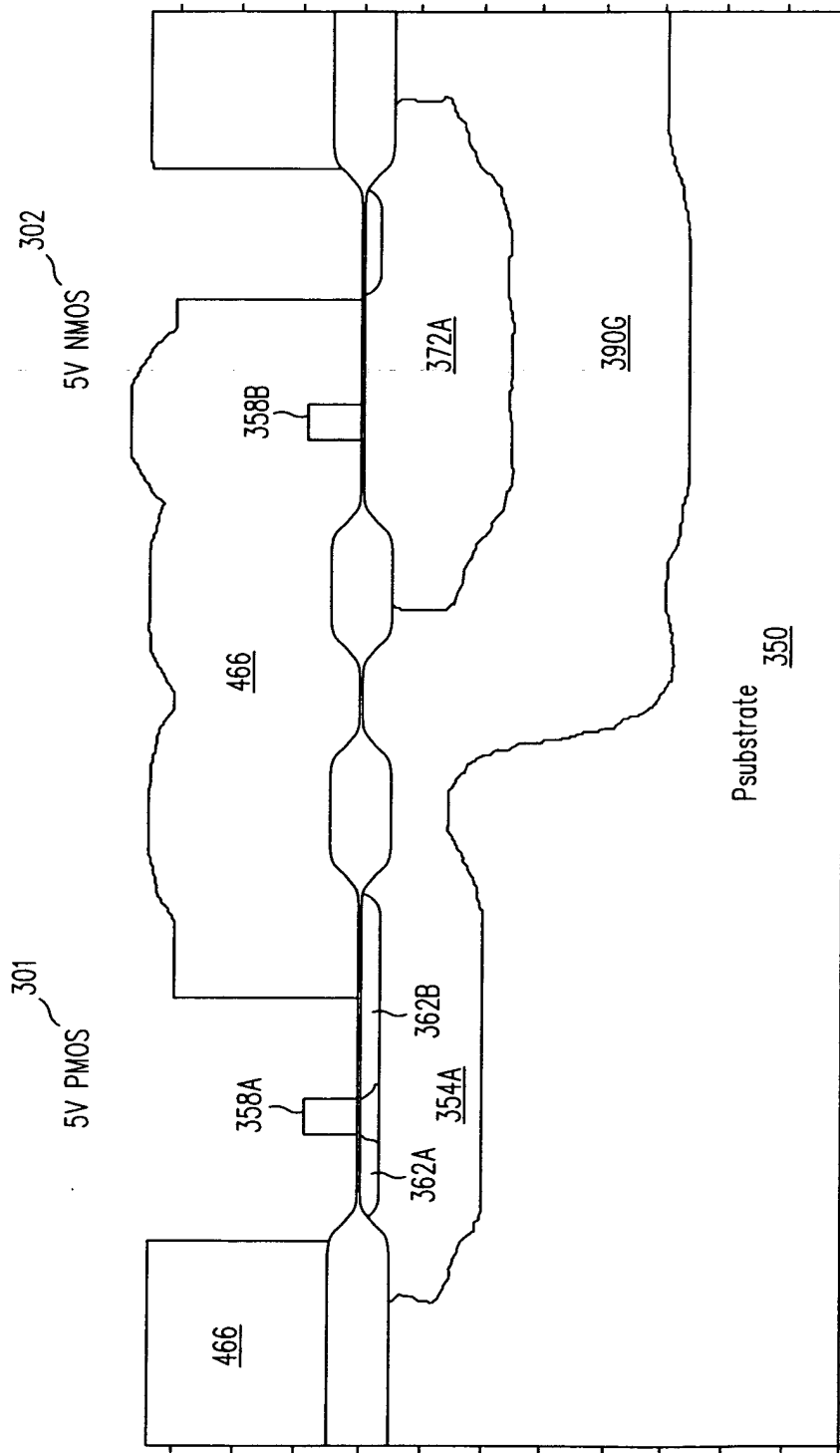


12V P-LDD Implant
FIG. 57E



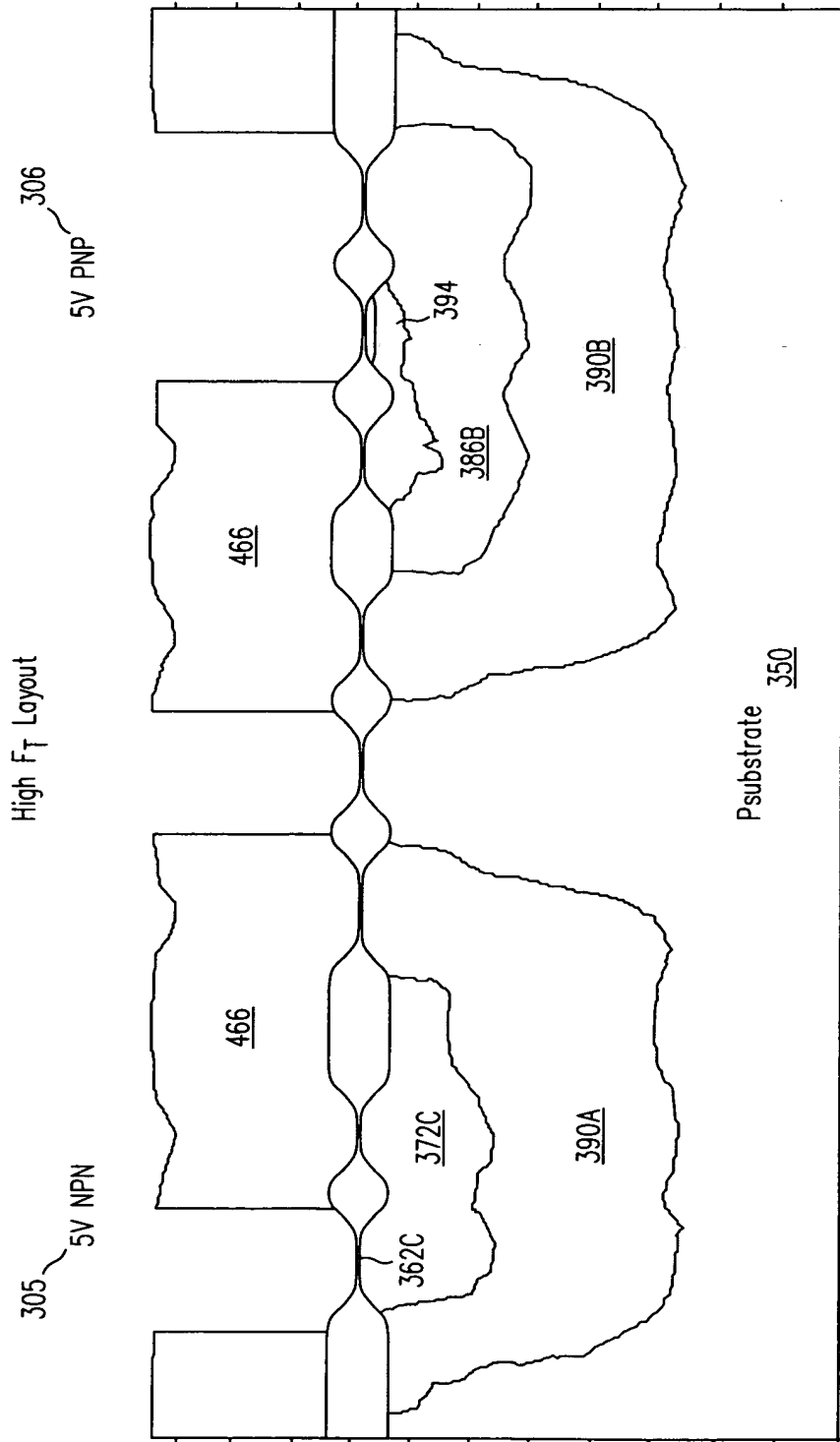
12V N-LDD Implant

FIG. 58E



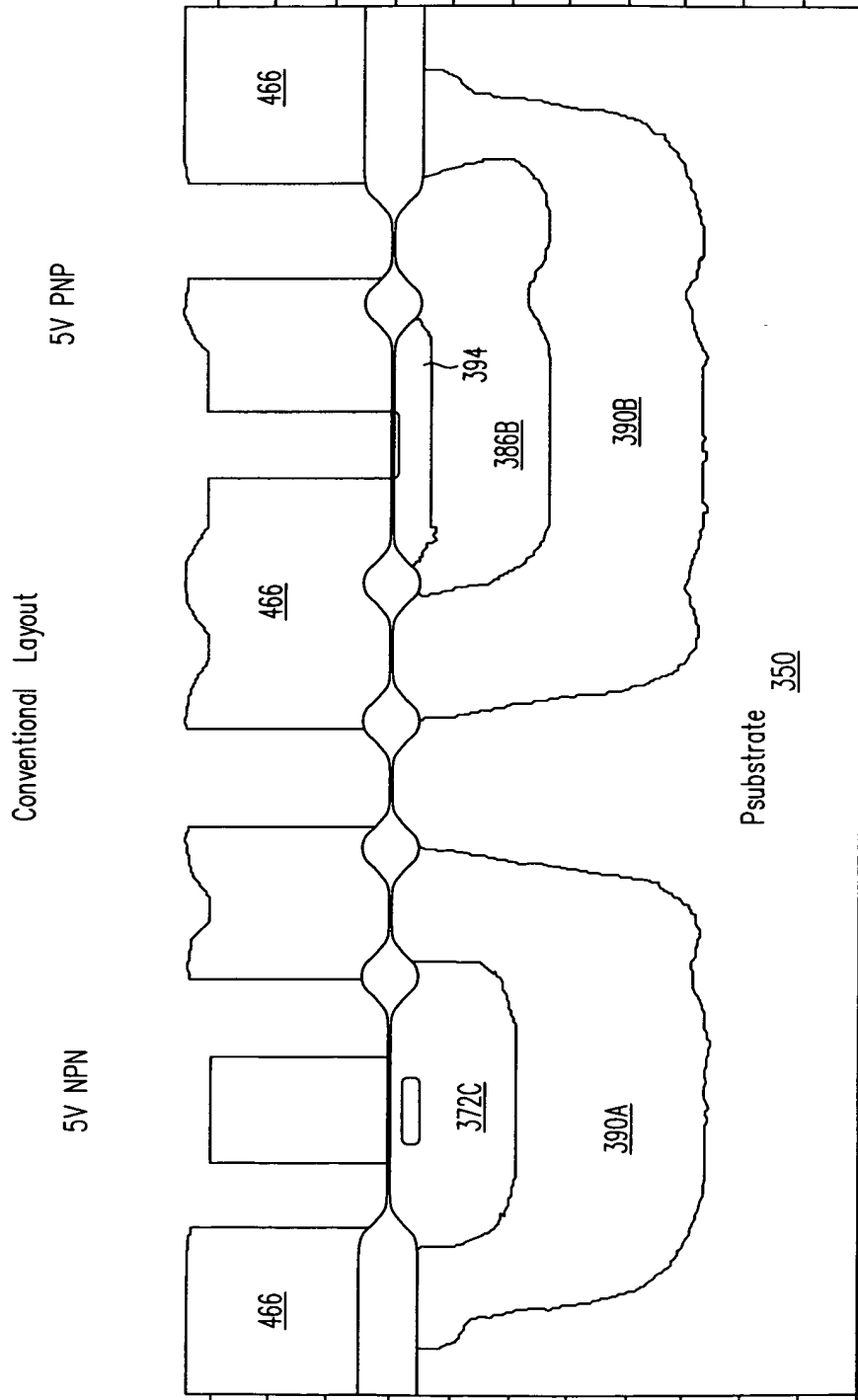
5V P-LDD Implant

FIG. 59A



5V P-LDD Implant

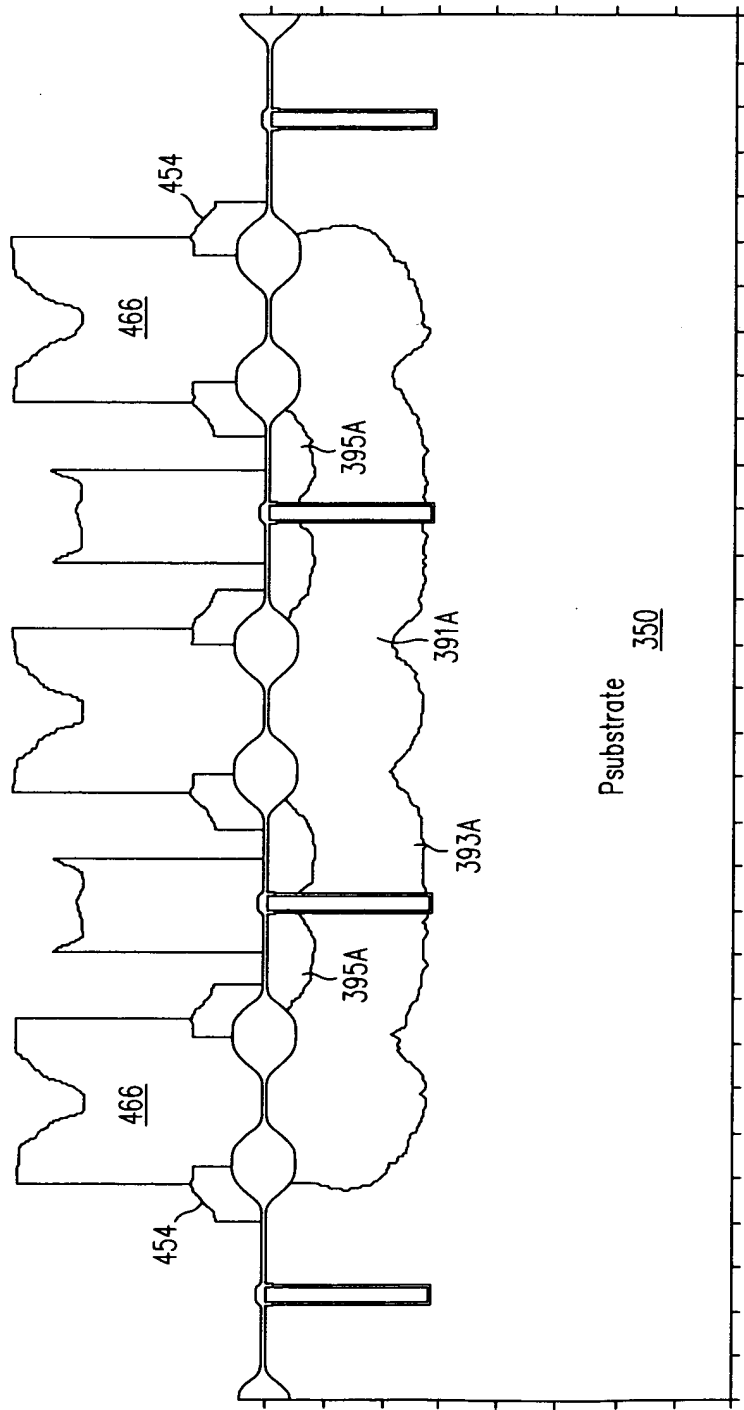
FIG. 59B



5V P-LDD Implant

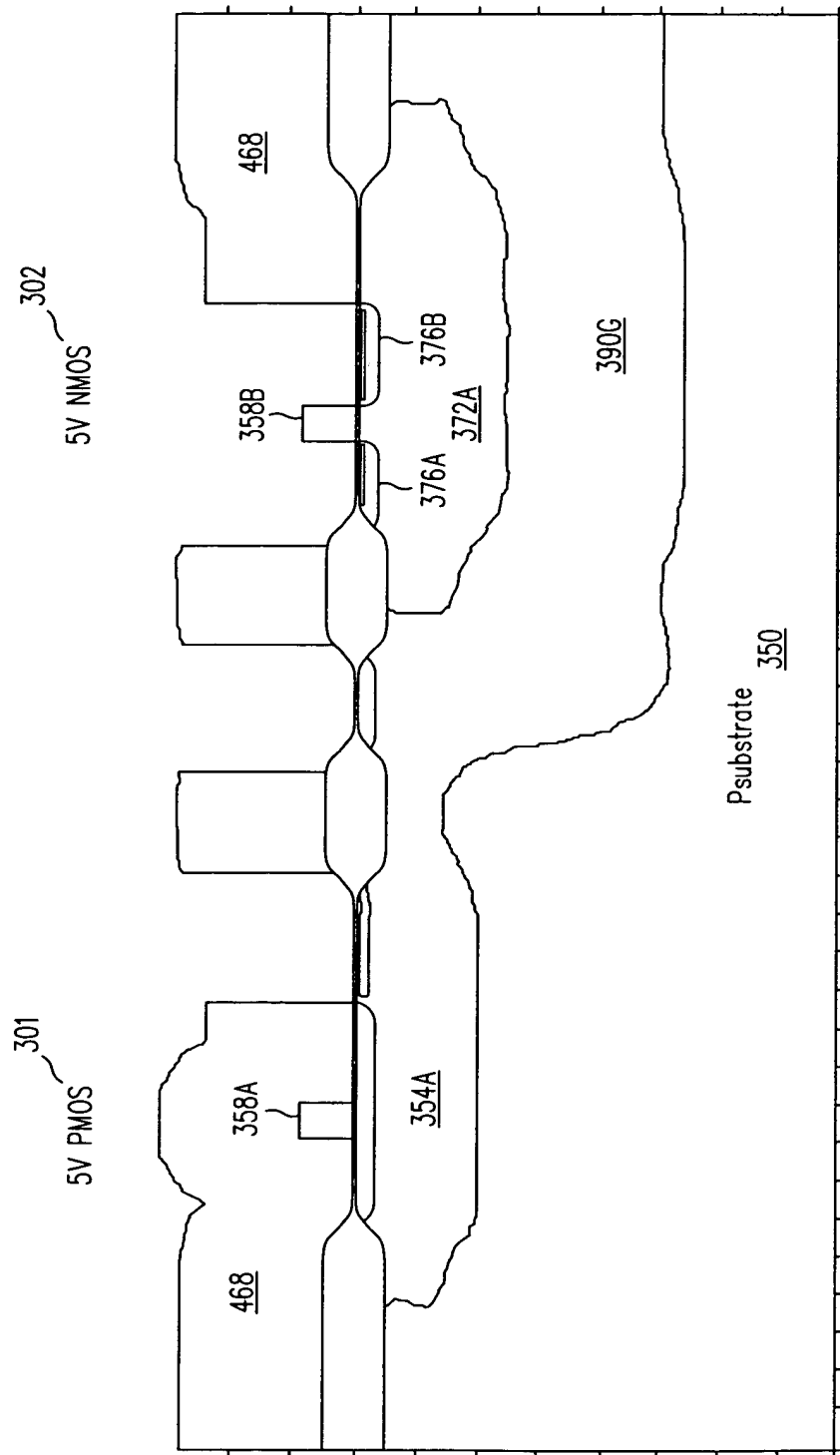
FIG. 59C

30V Lateral Trench DMOS ~ 308



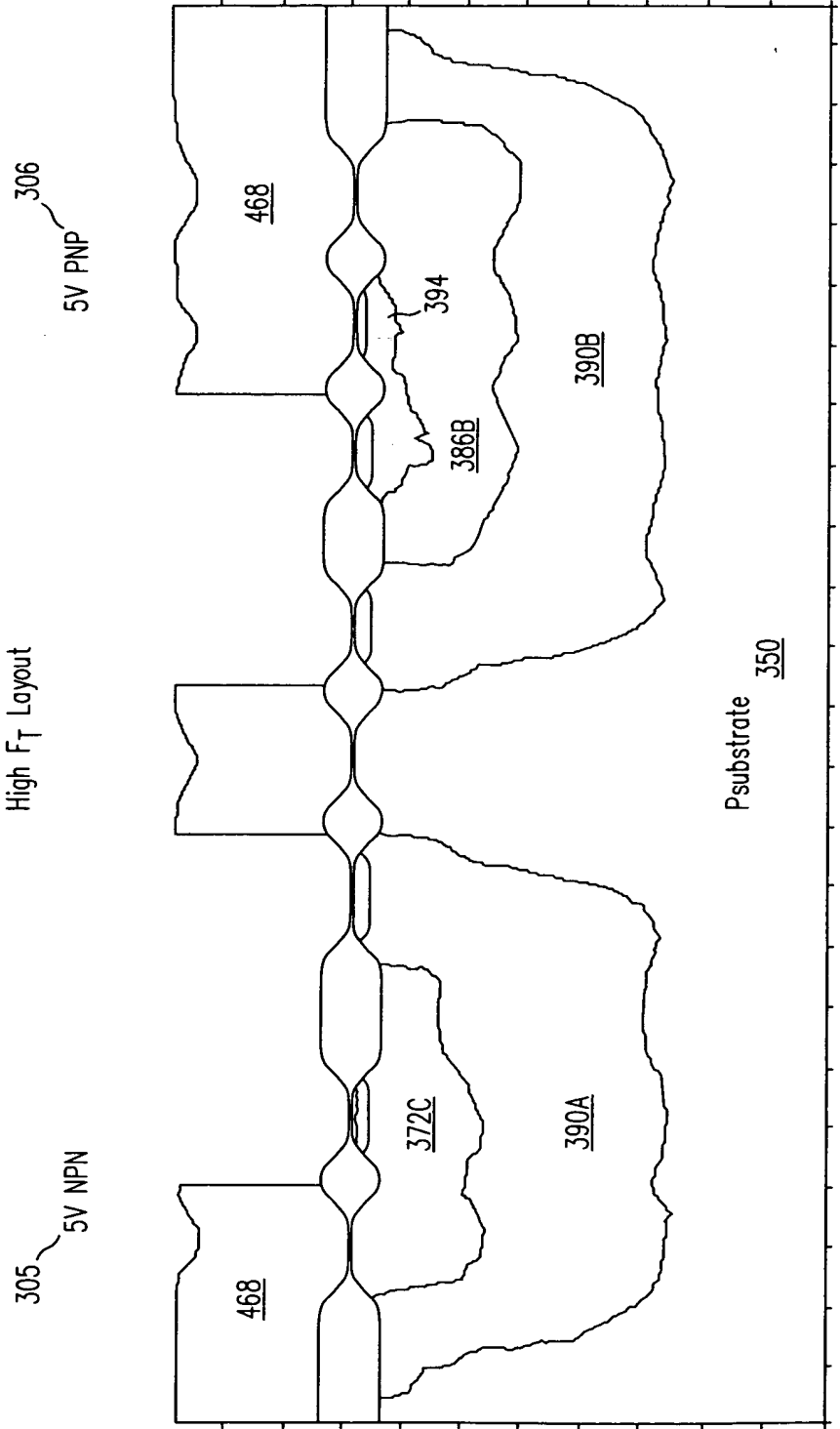
5V P-LDD Implant

FIG. 59D



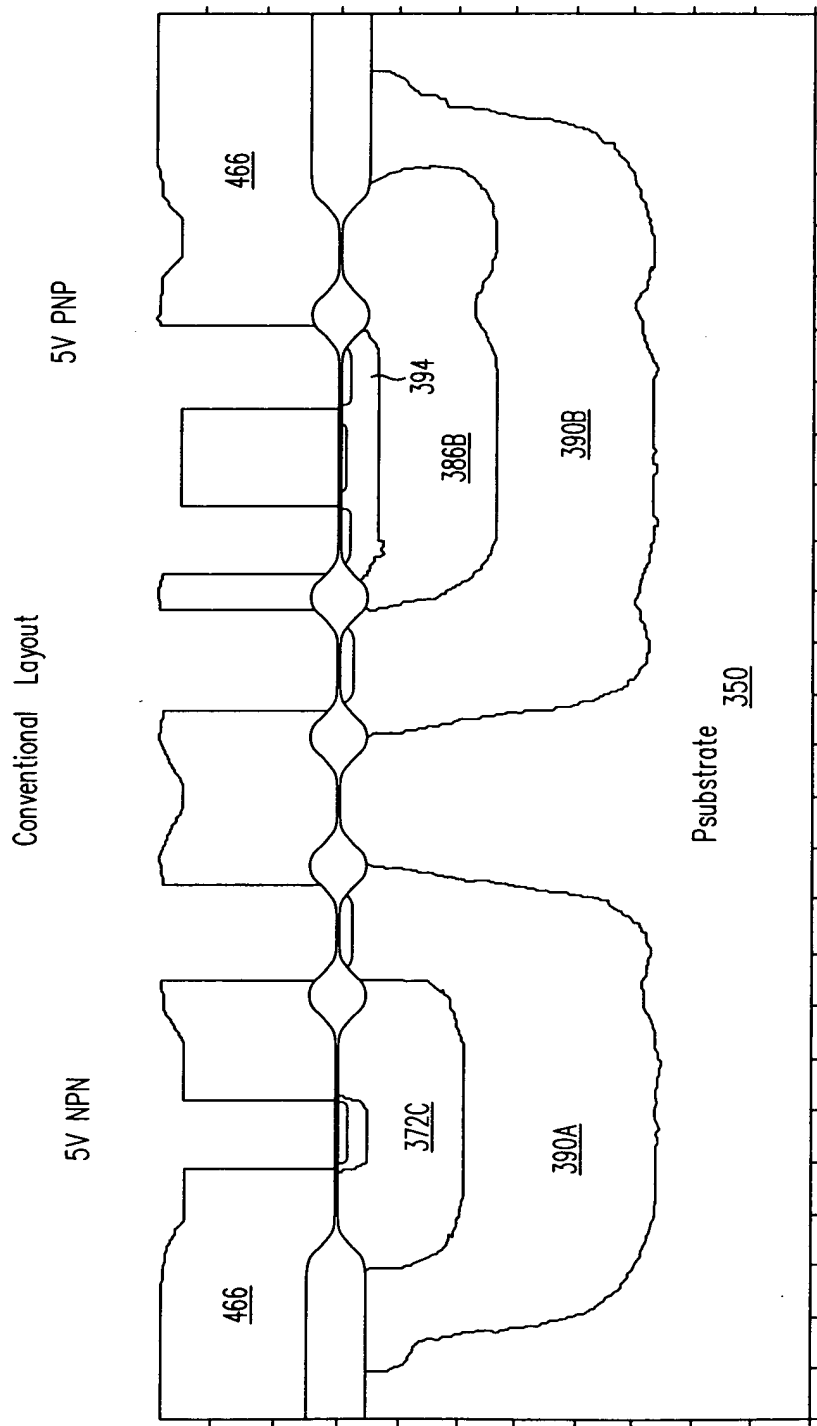
5V N-LDD Implant

FIG. 60A



5V N-LDD Implant

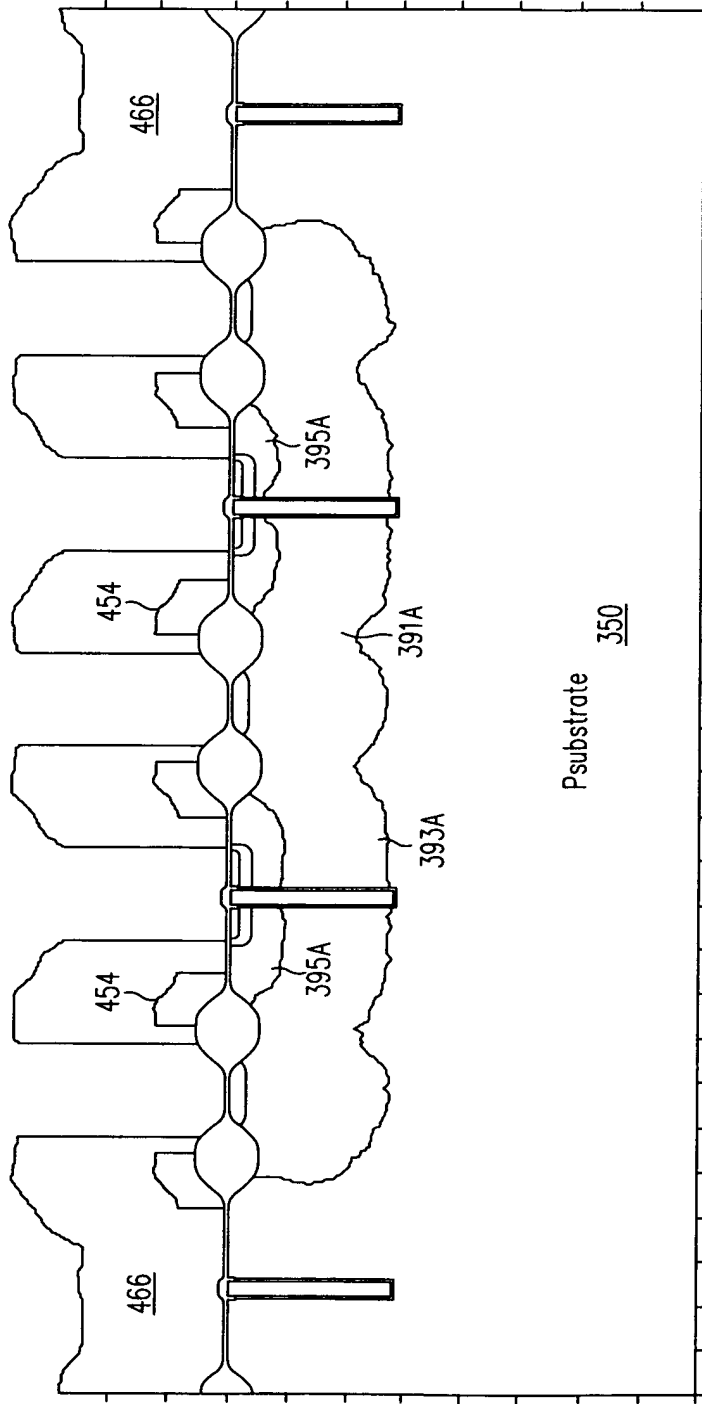
FIG. 60B



5V N-LDD Implant

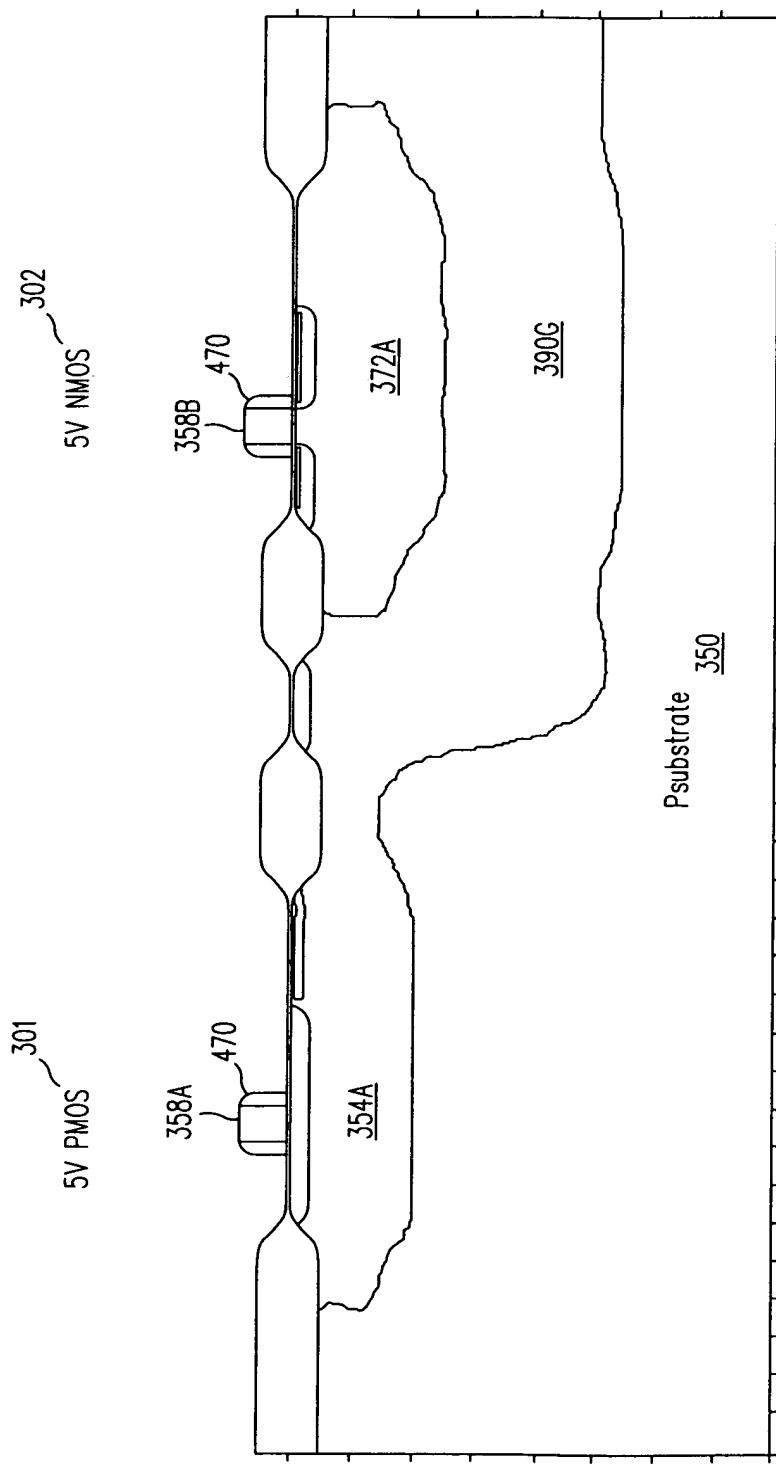
FIG. 60C

30V Lateral Trench DMOS ~ 308



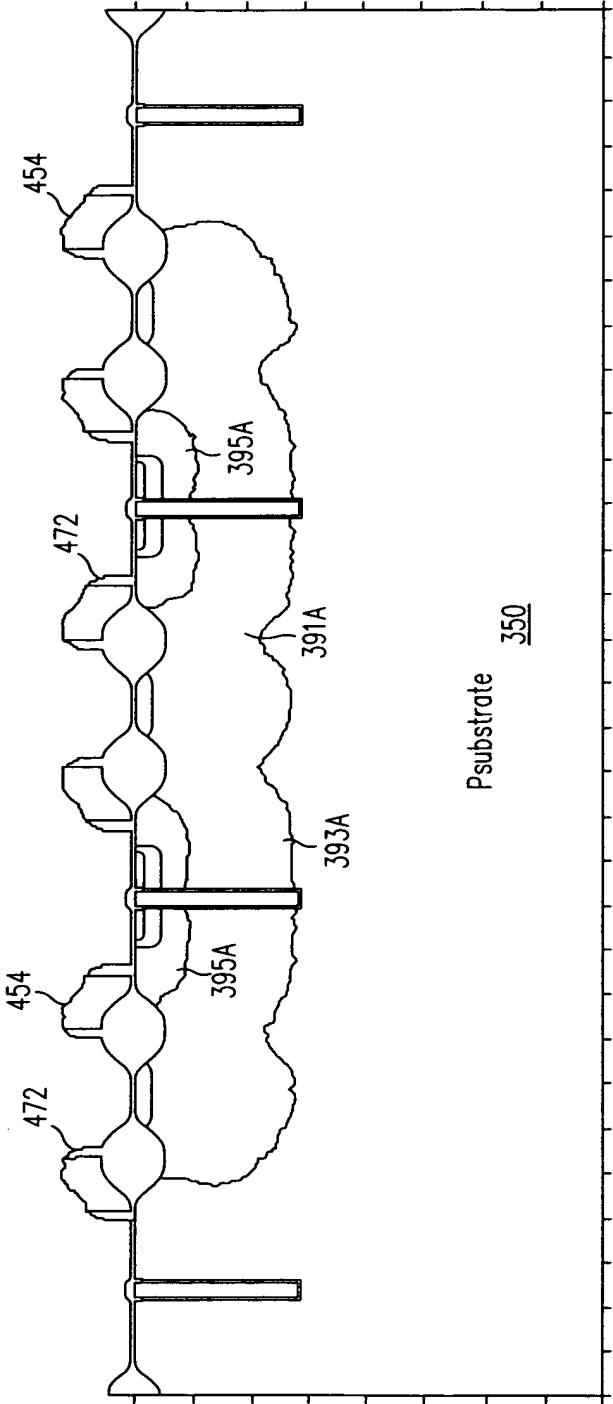
5V N-LDD Implant

FIG. 60D



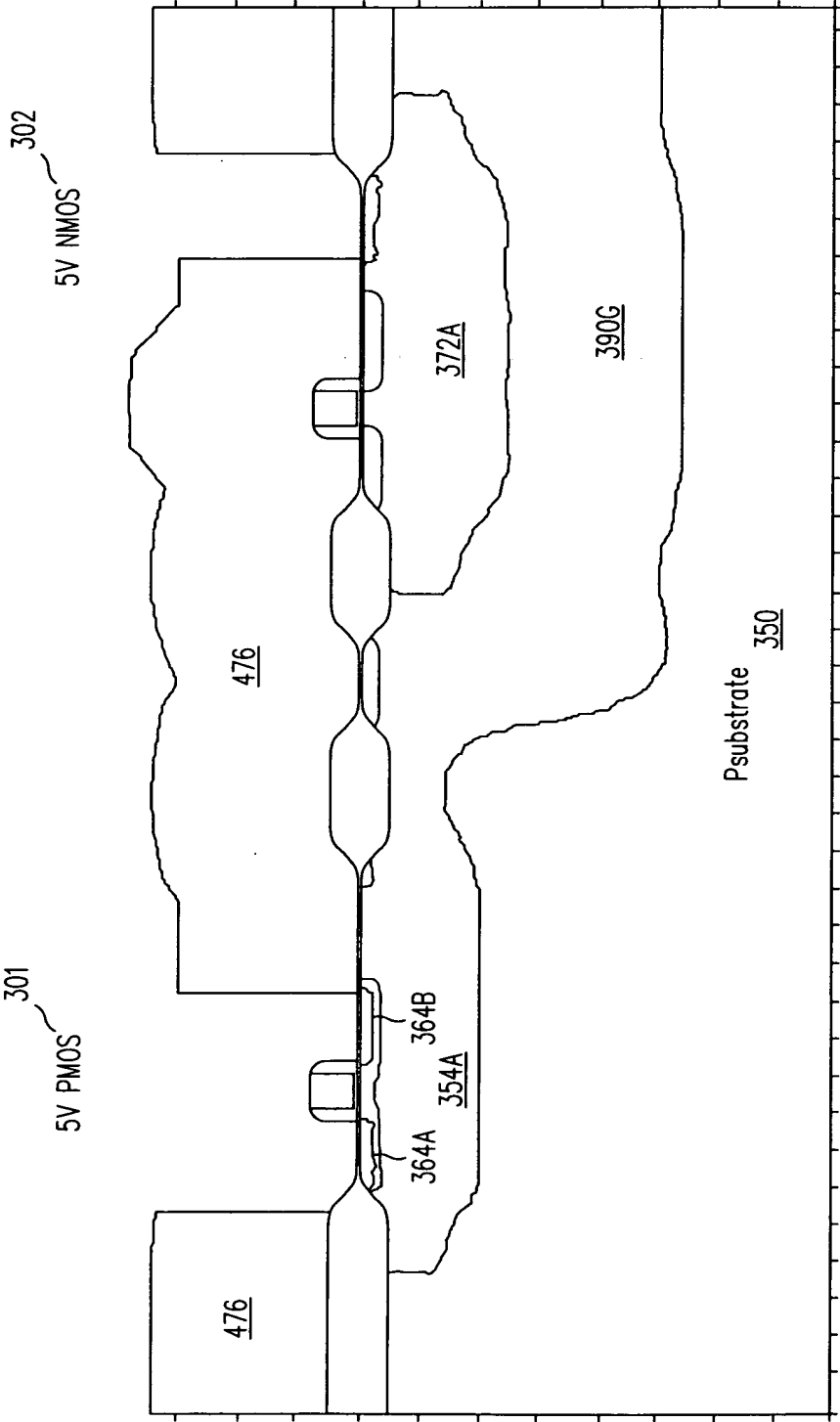
Sidewall Spacers
FIG. 61A

30V Lateral Trench DMOS ~ 308



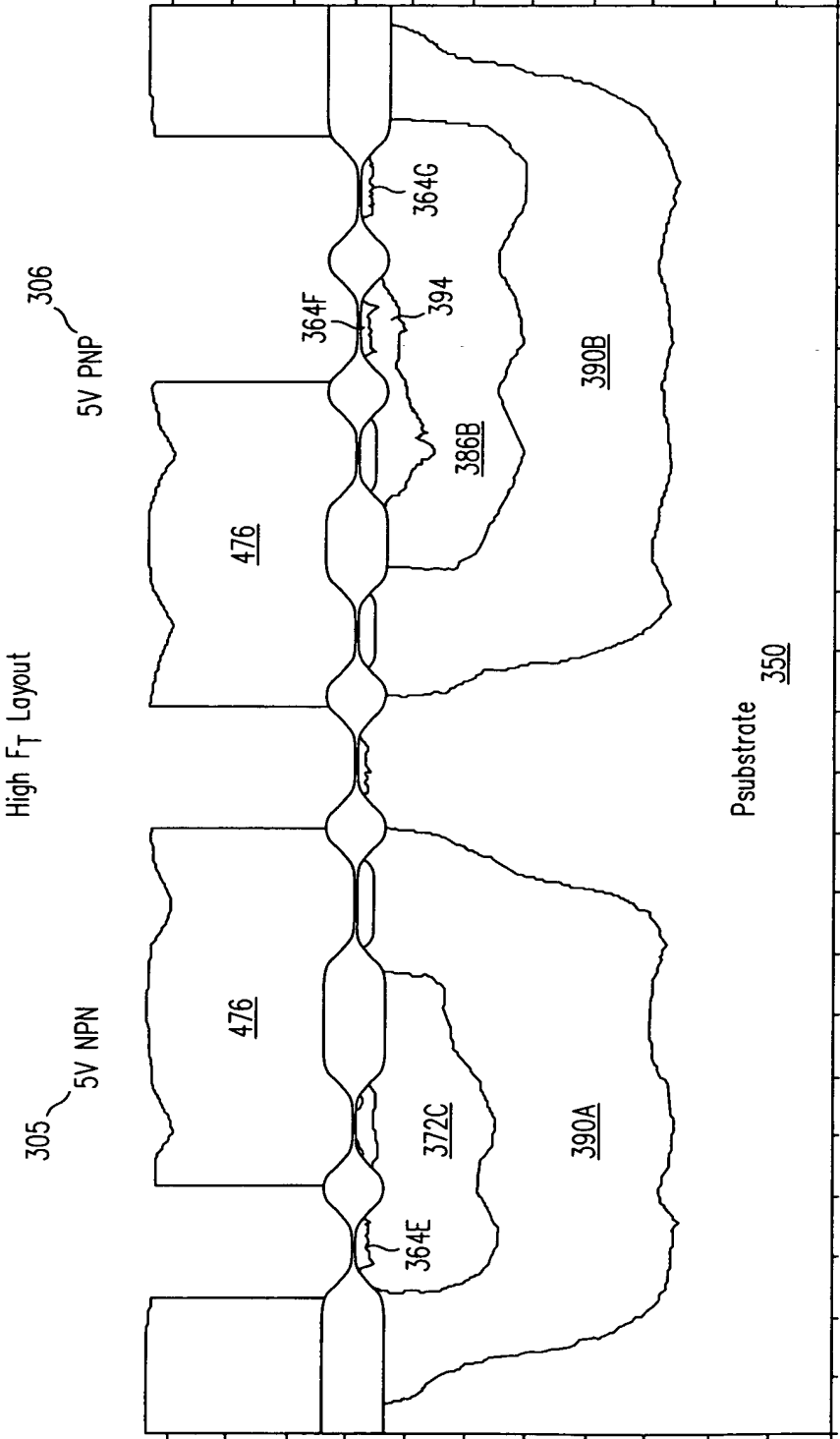
Sidewall Spacers

FIG. 61D



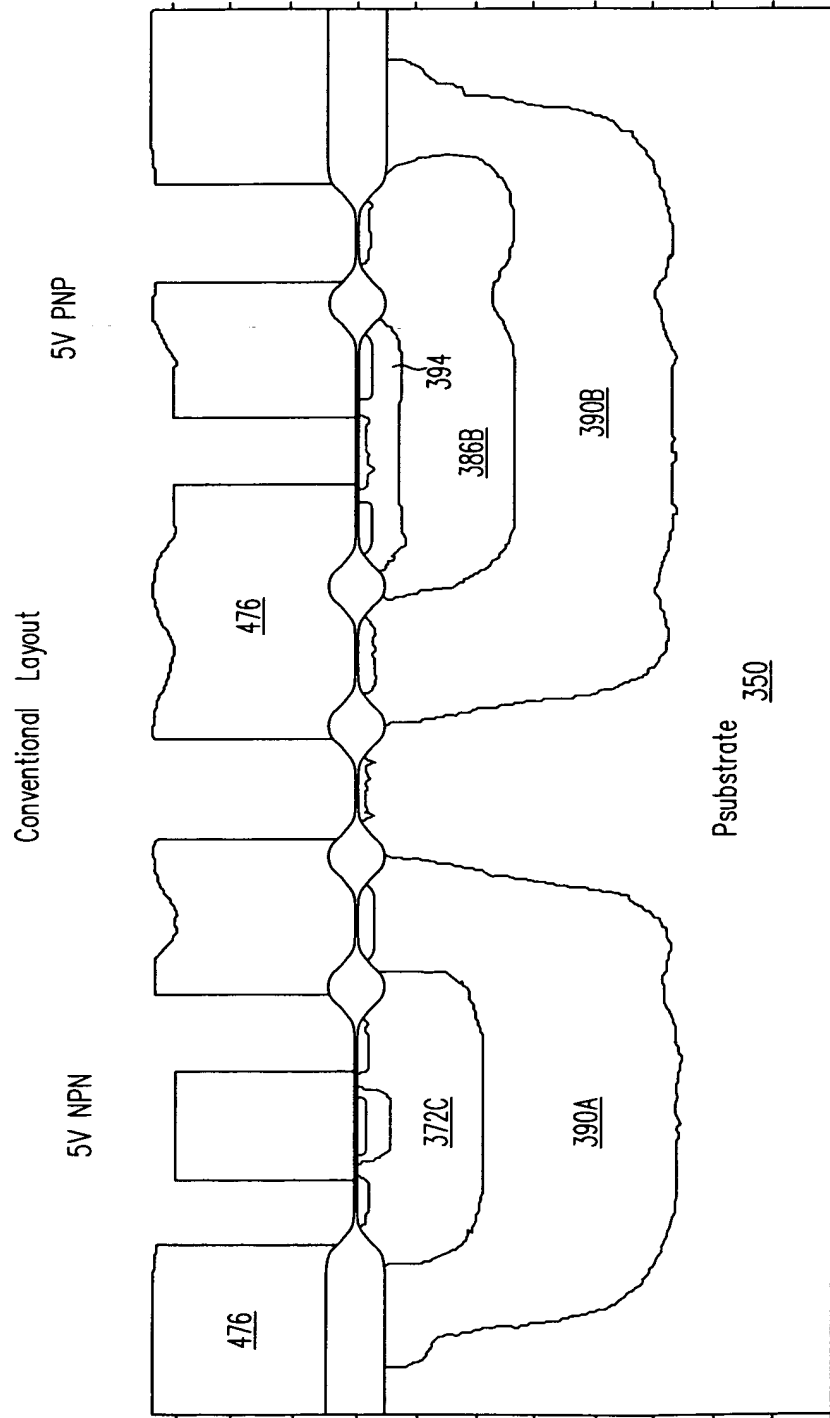
P+ Implant

FIG. 62A



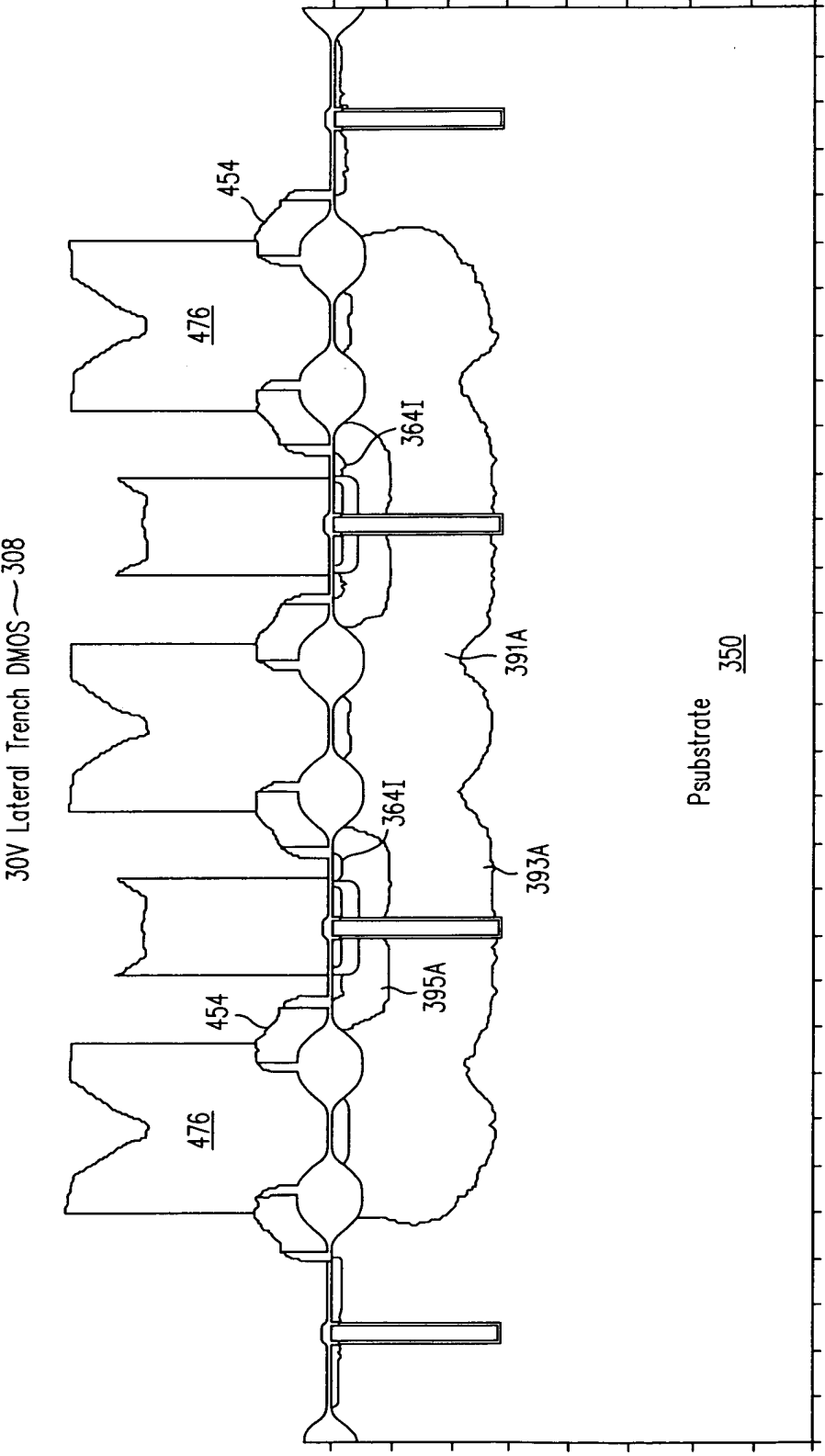
P+ Implant

FIG. 62B



P+ Implant

FIG. 62C



P+ Implant

FIG. 62D

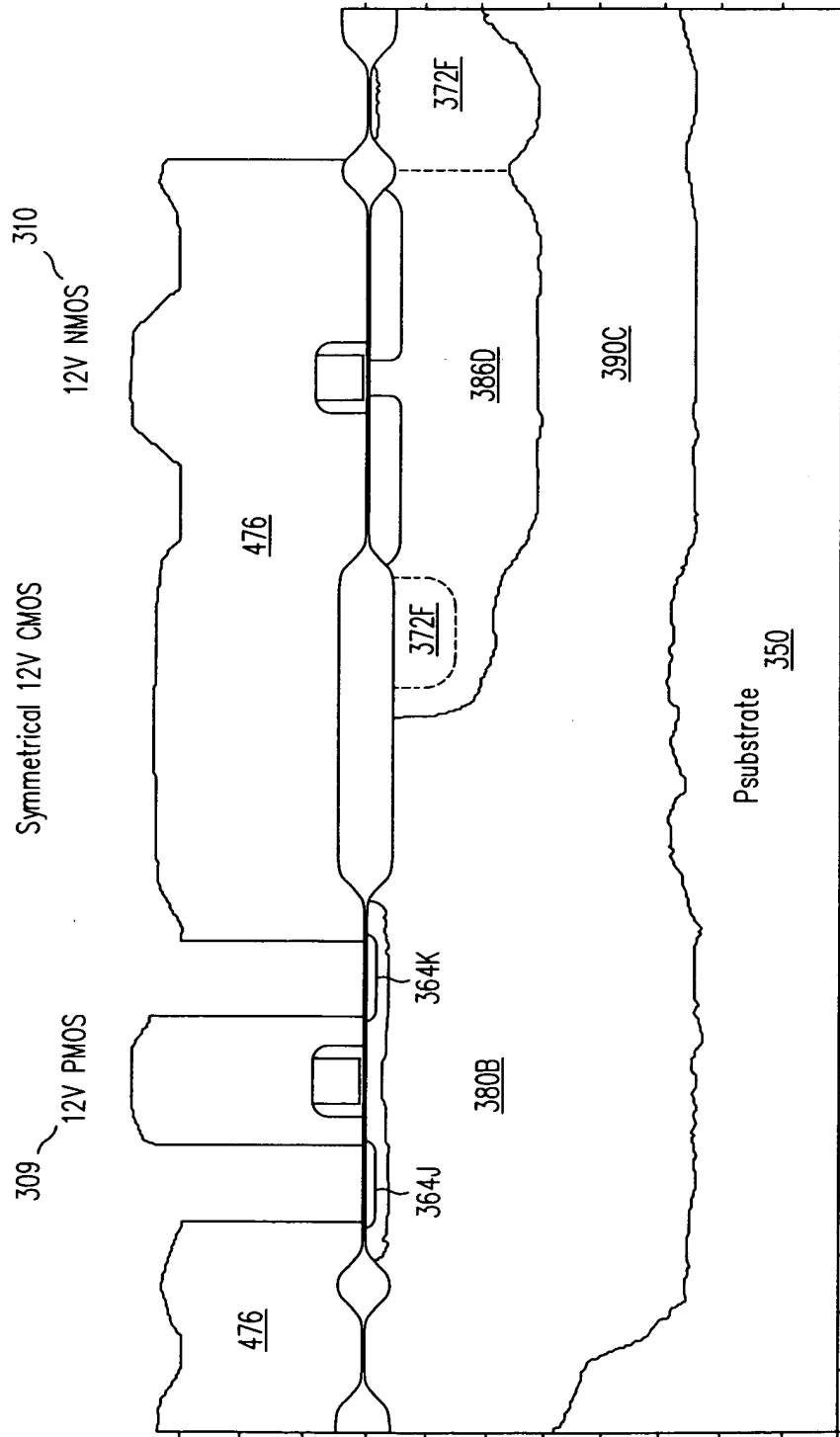
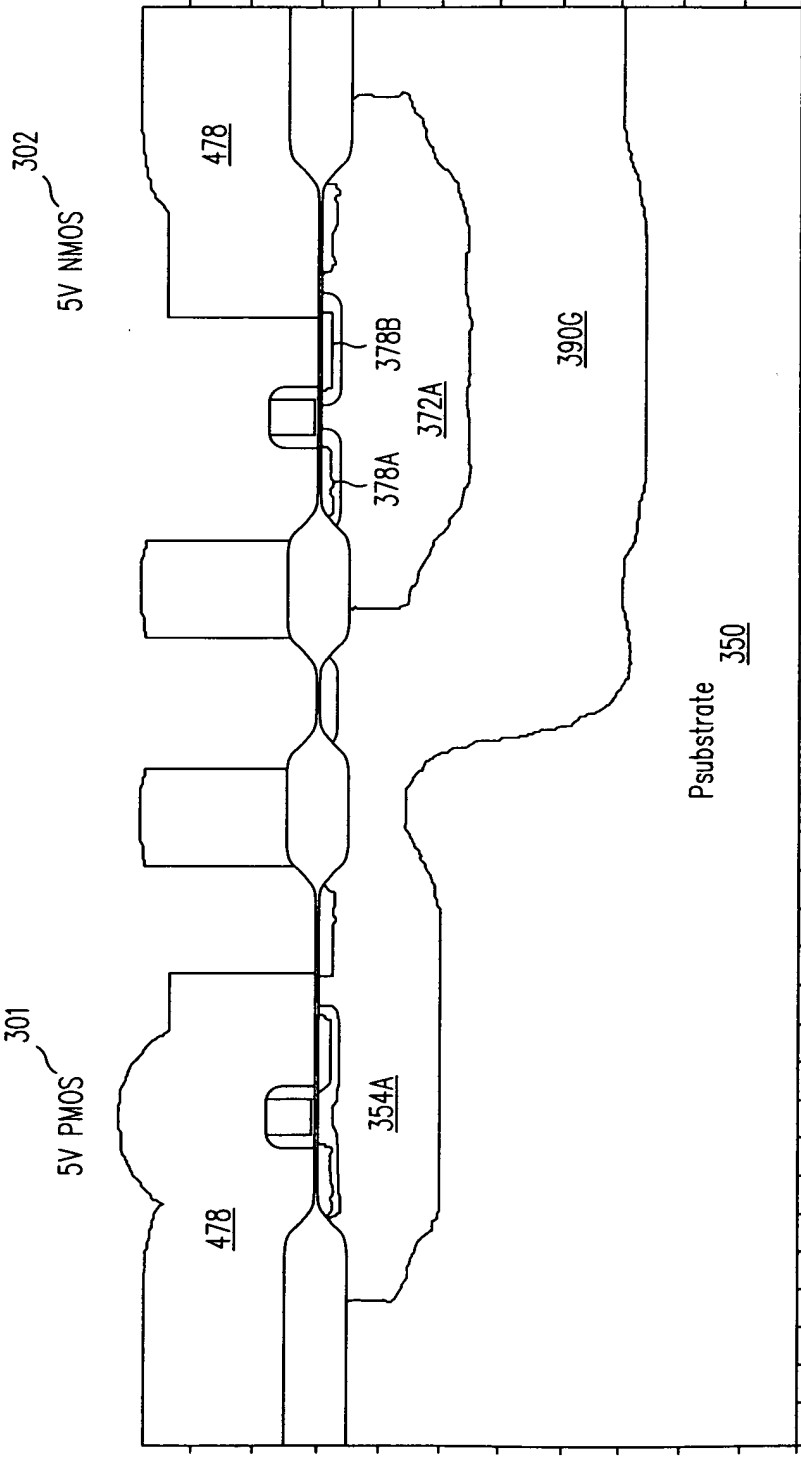
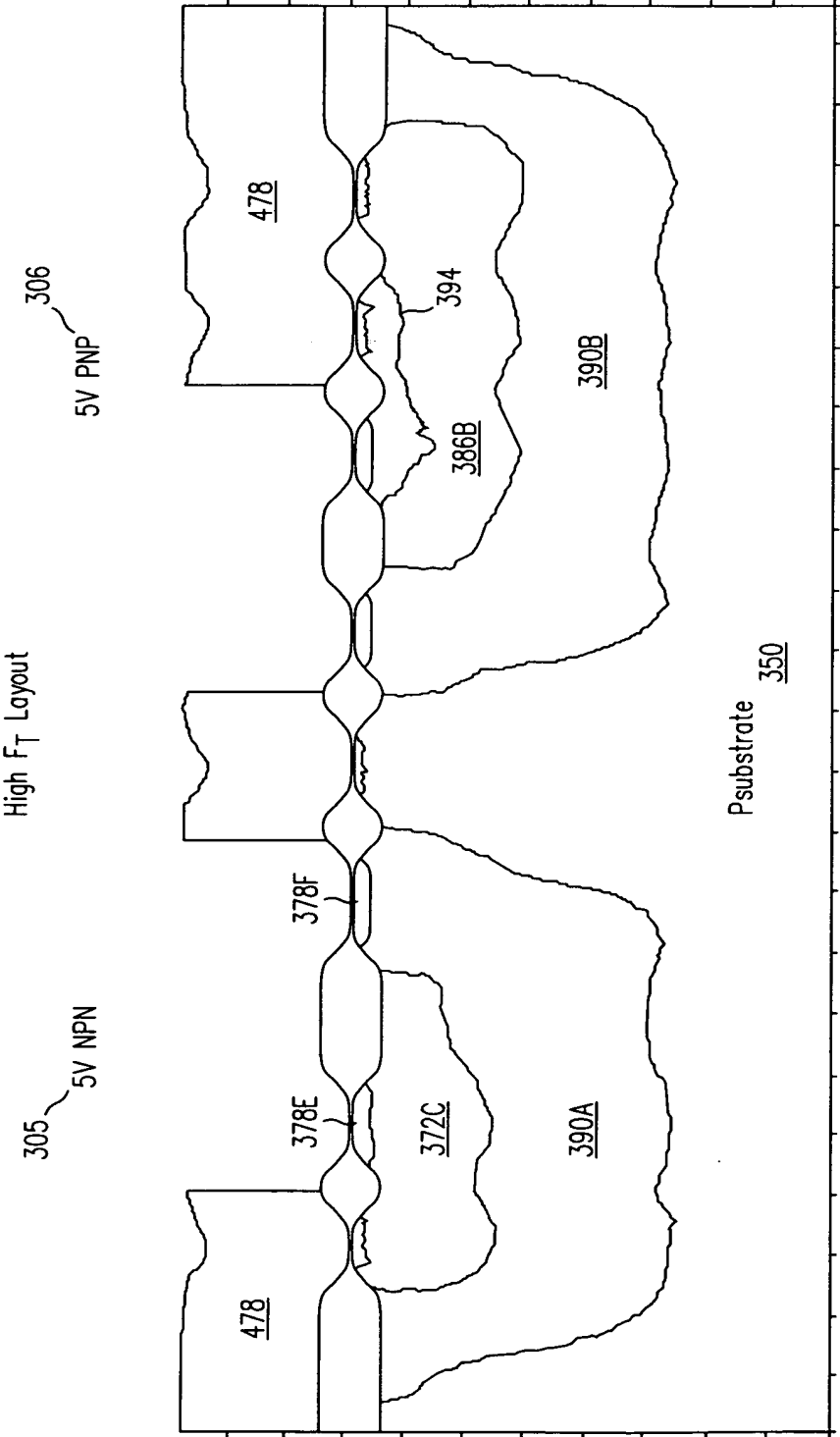


FIG. 62E



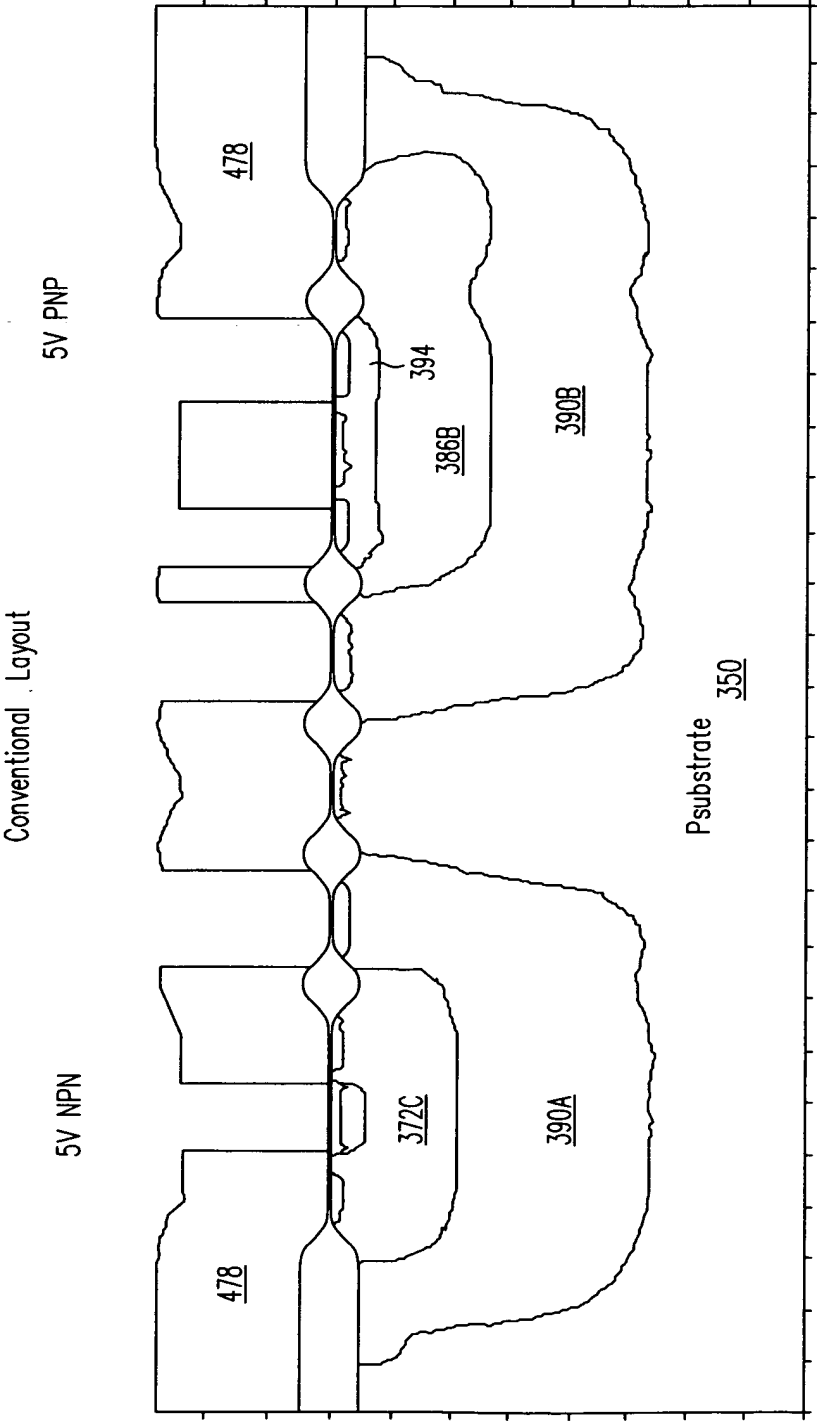
N+ Implant

FIG. 63A



N+ Implant

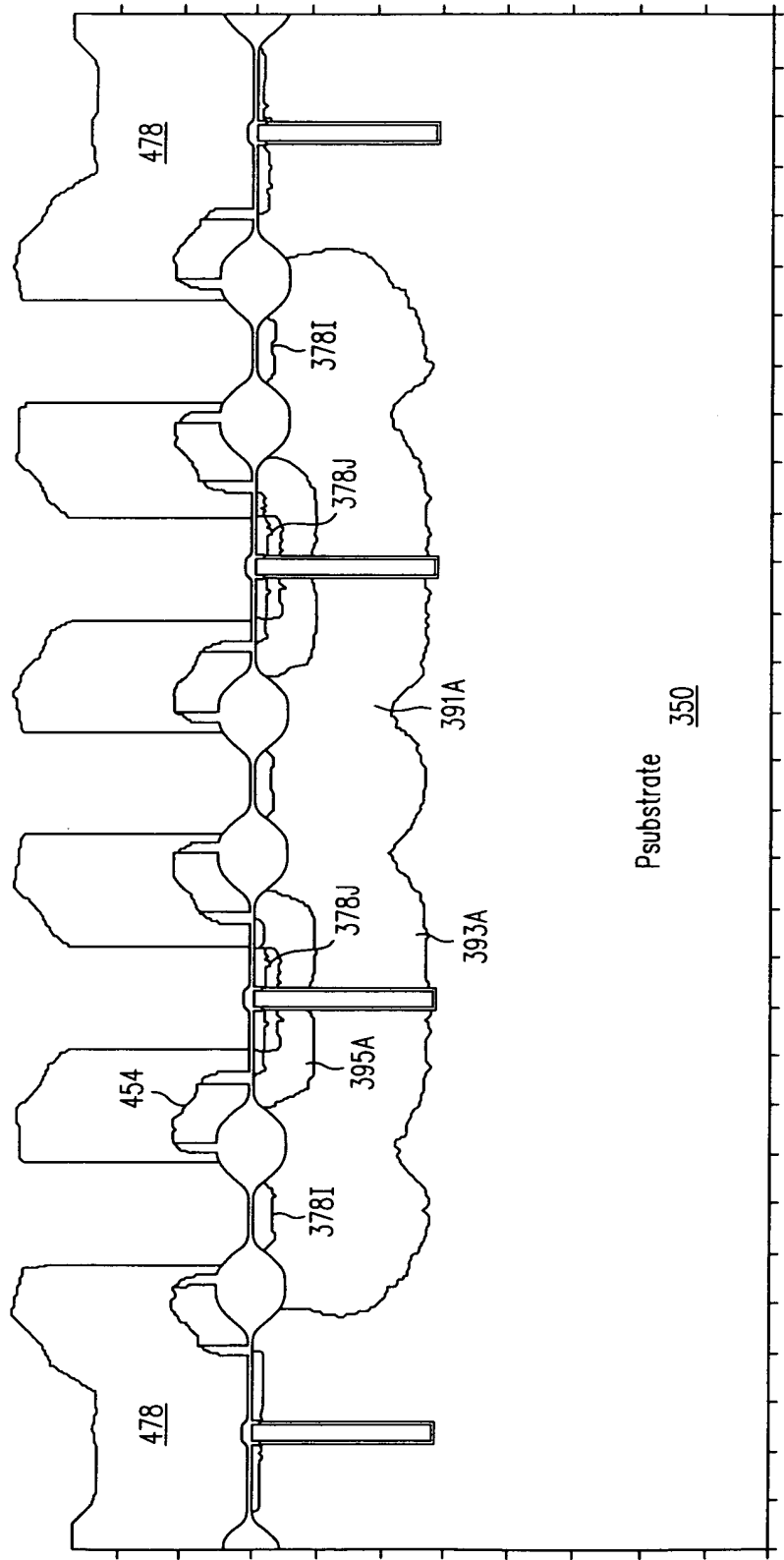
FIG. 63B



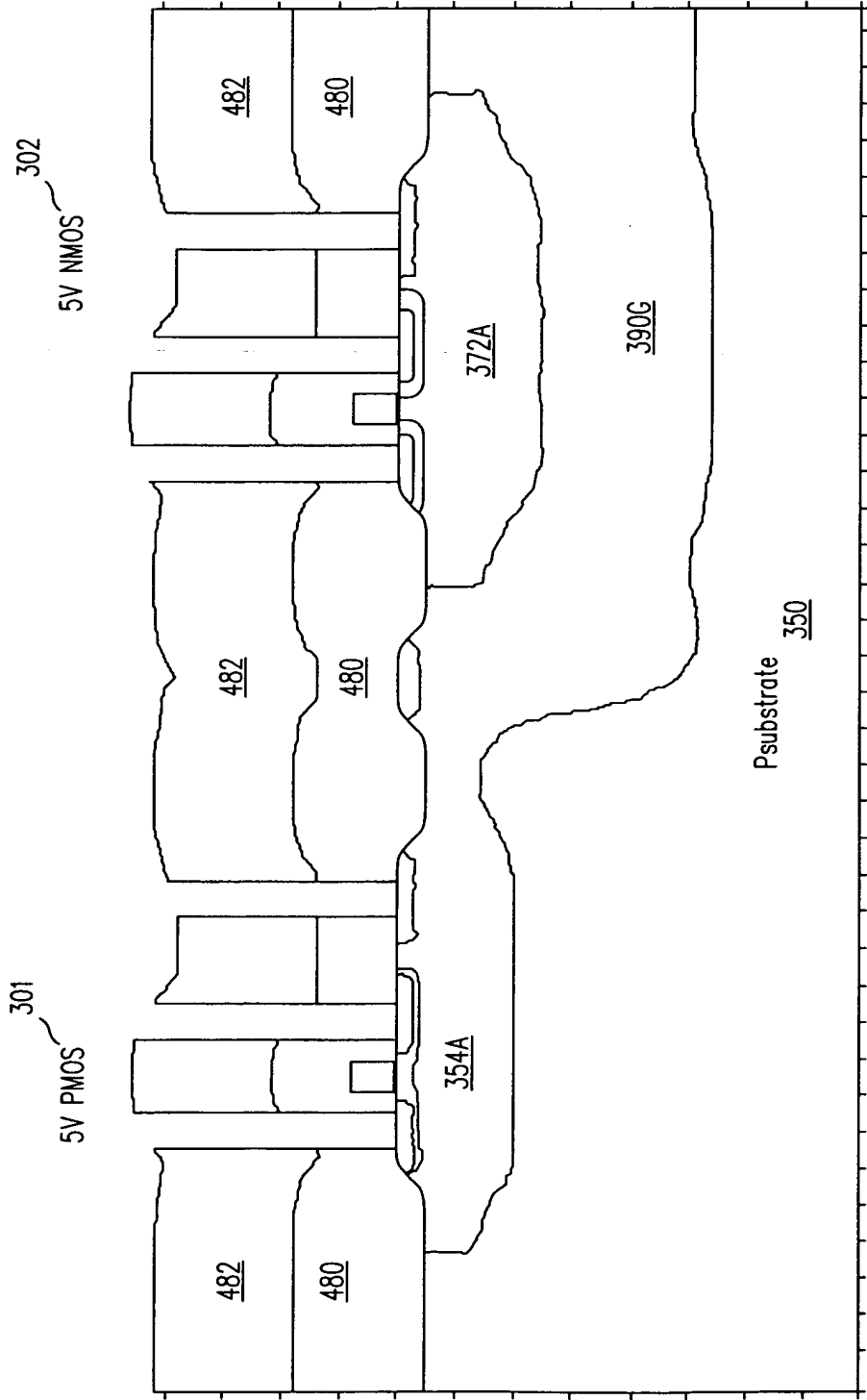
N+ Implant

FIG. 63C

30V Lateral Trench DMOS ~ 308

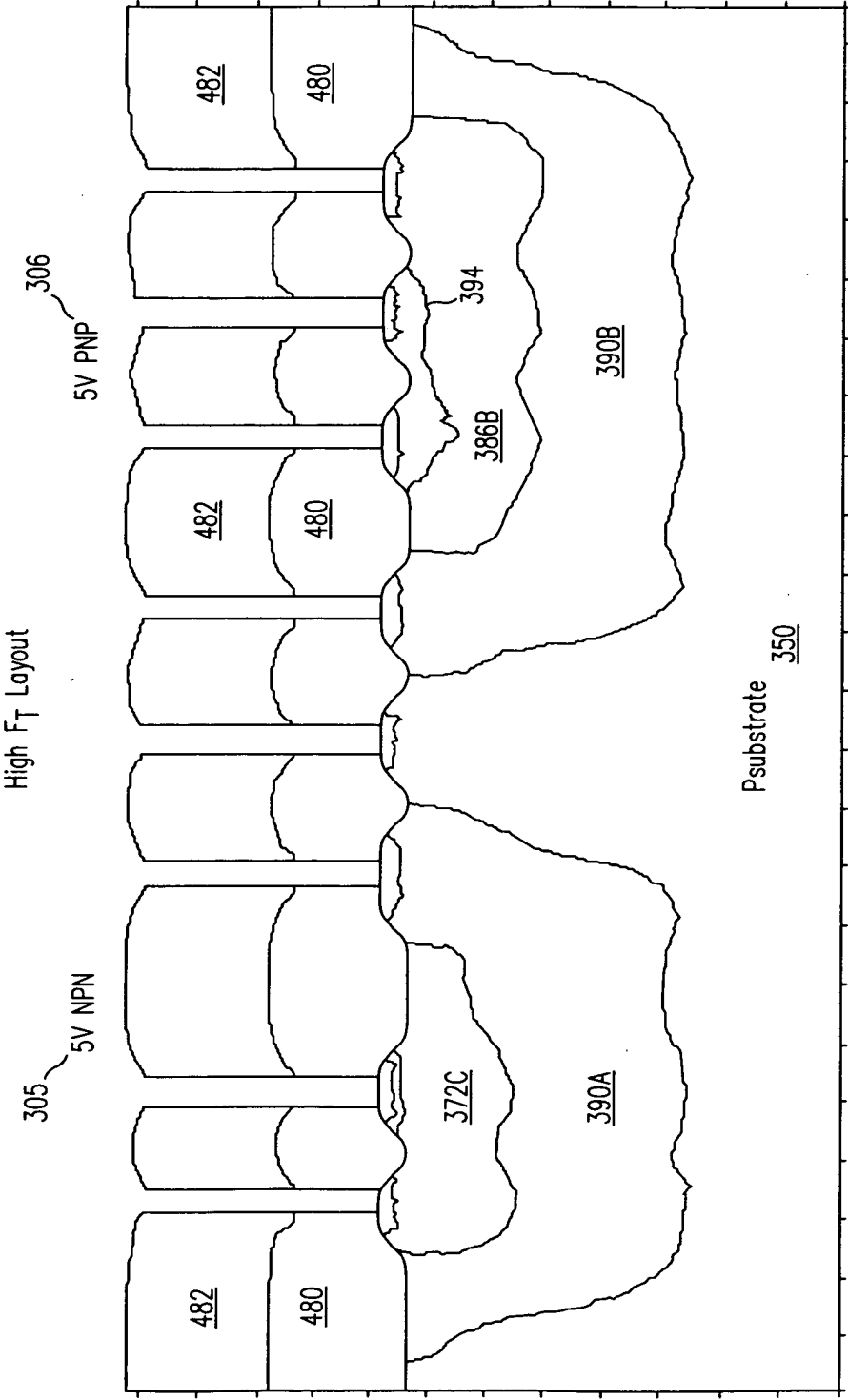


N+ Implant
FIG. 63D



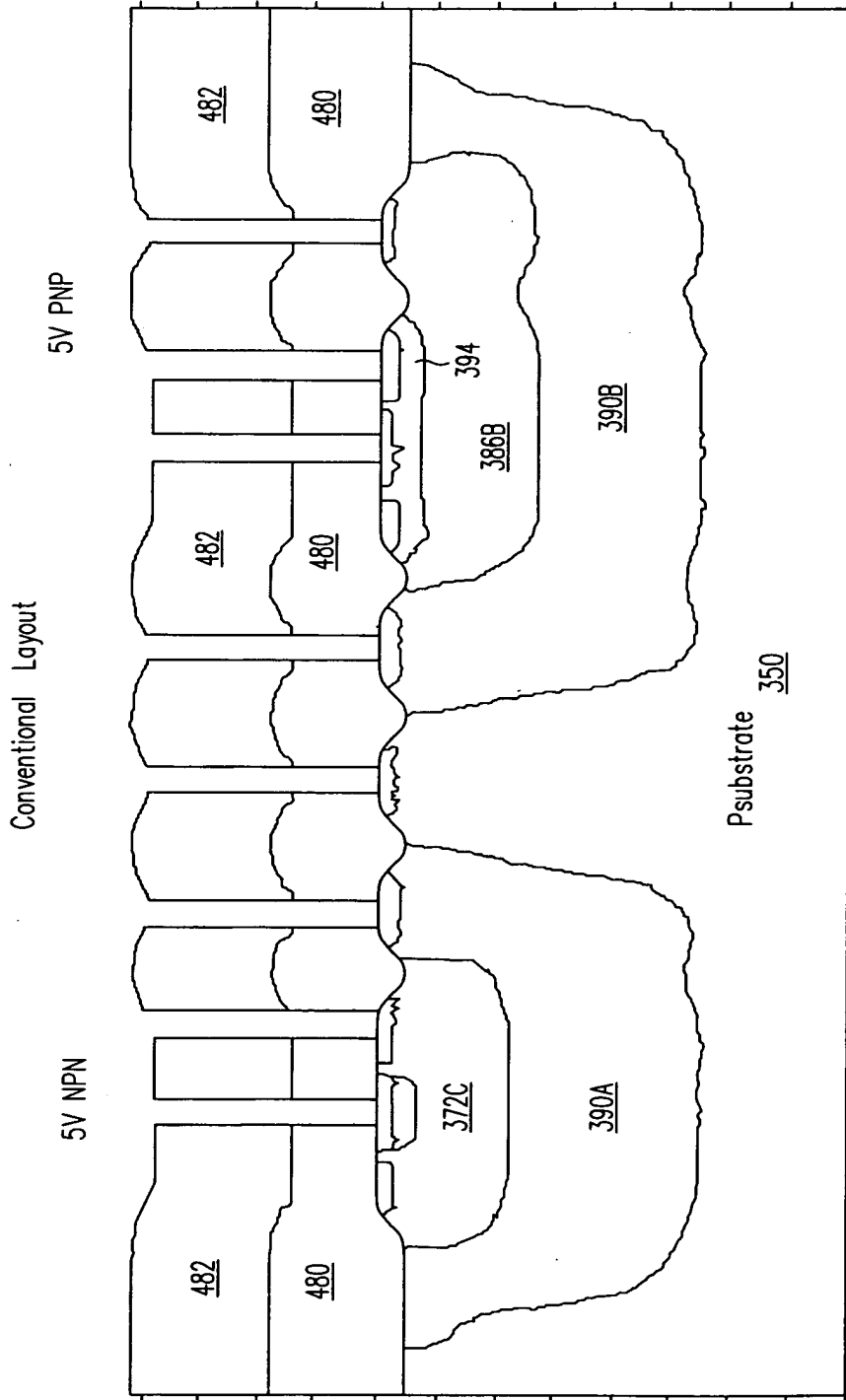
Interlayer Dielectric Deposition and Etch

FIG. 64A



Interlayer Dielectric Deposition and Etch

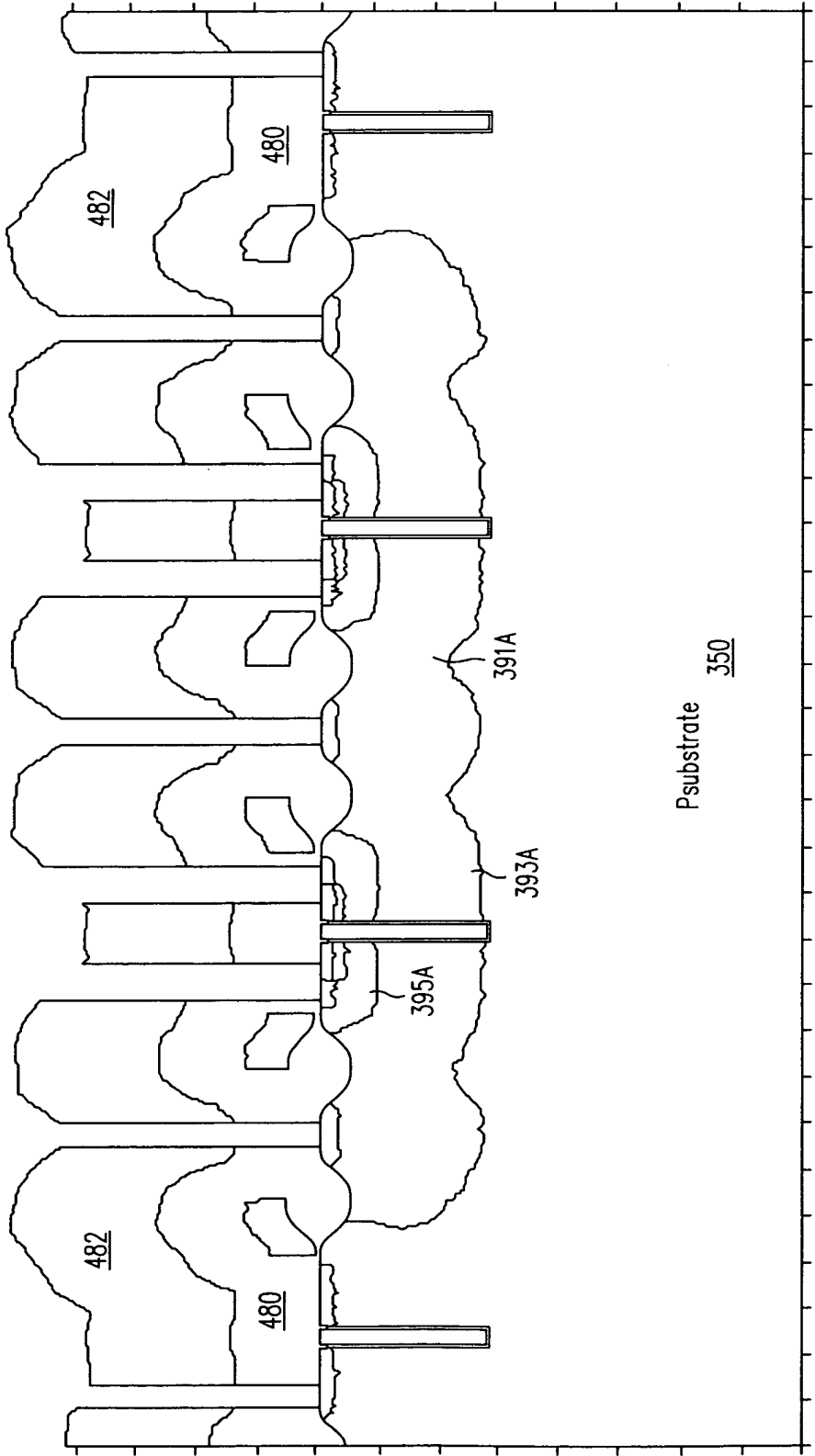
FIG. 64B



Interlayer Dielectric Deposition and Etch

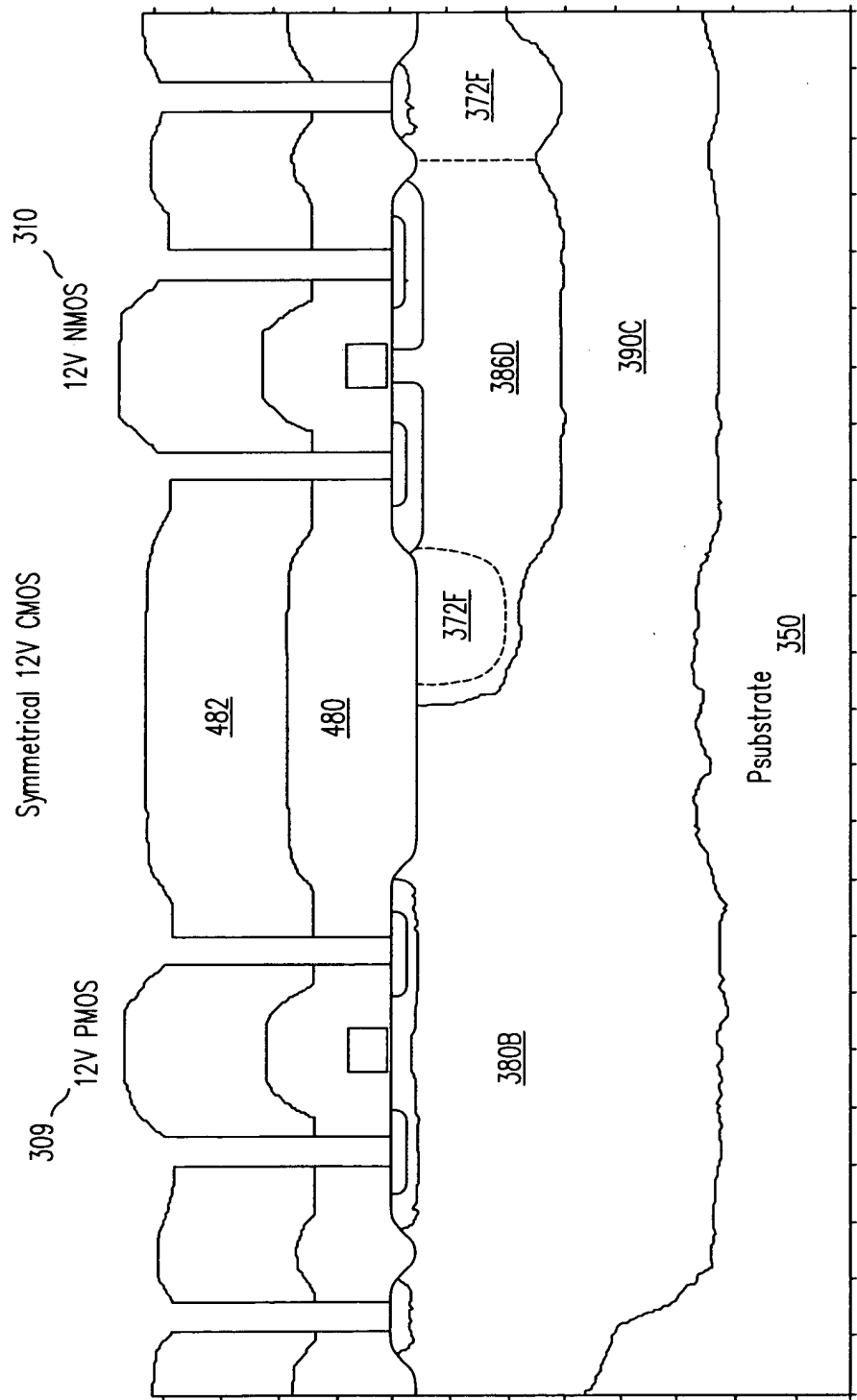
FIG. 64C

30V Lateral Trench DMOS — 308



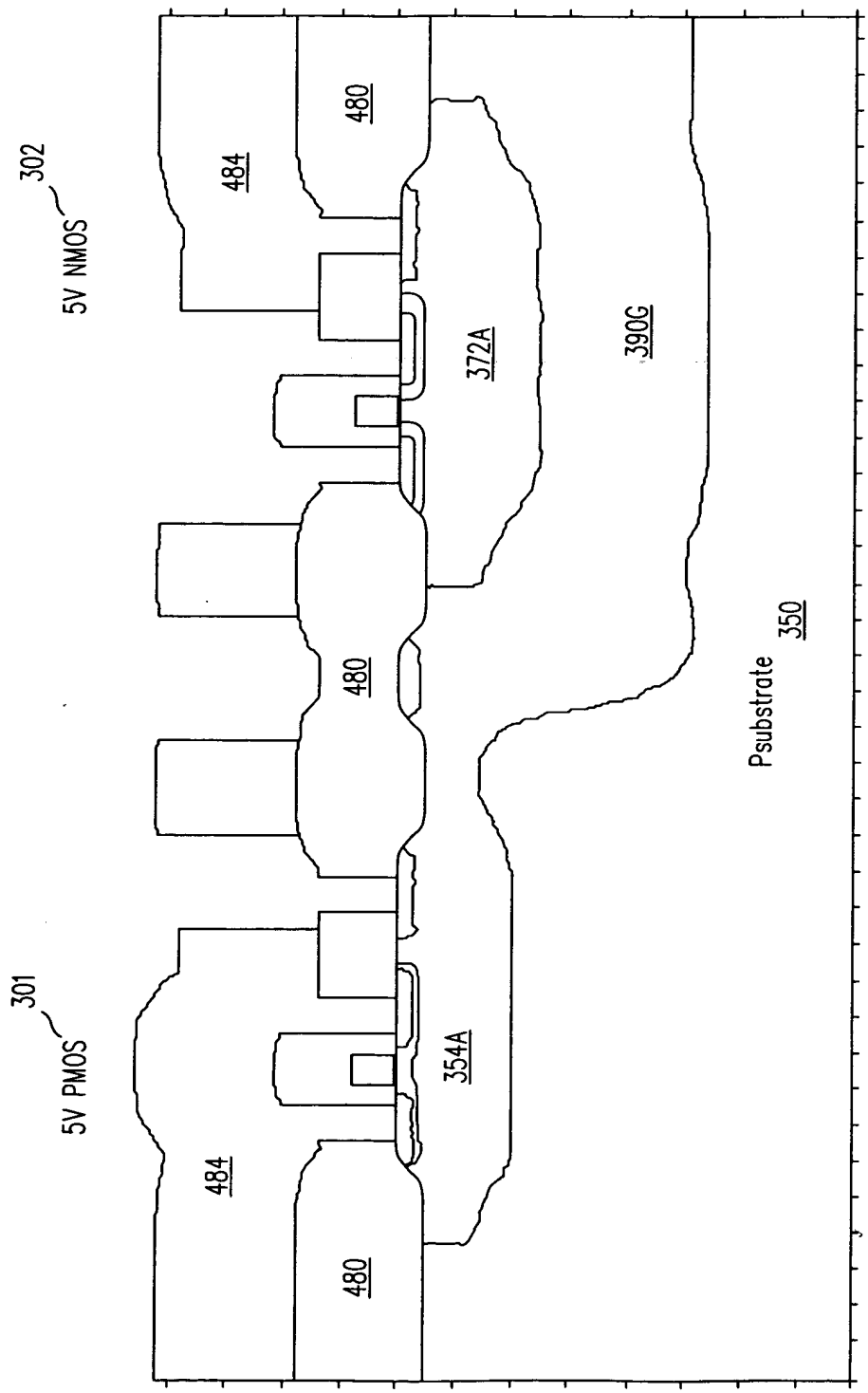
Interlayer Dielectric Deposition and Etch

FIG. 64D



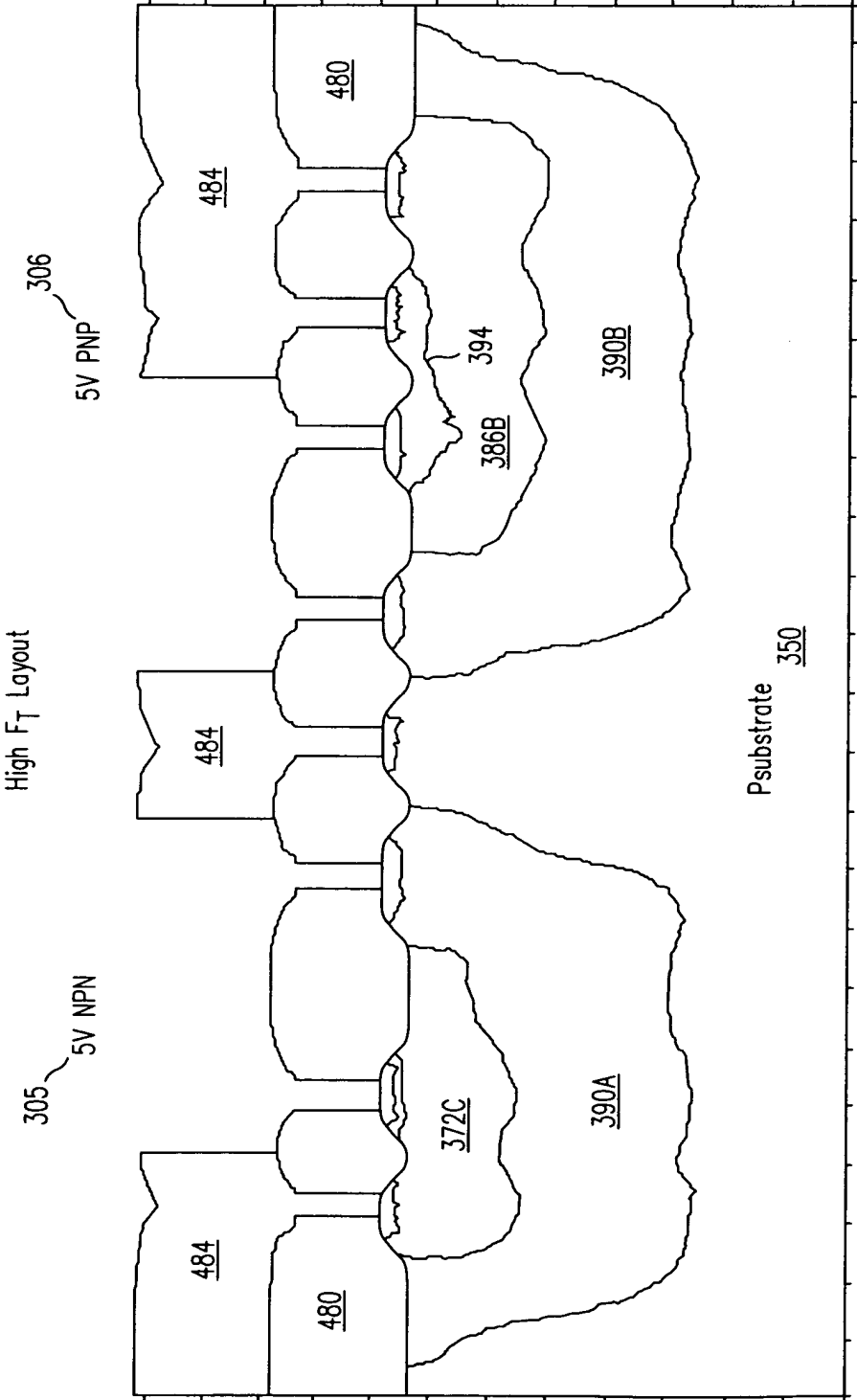
Interlayer Dielectric Deposition and Etch

FIG. 64E



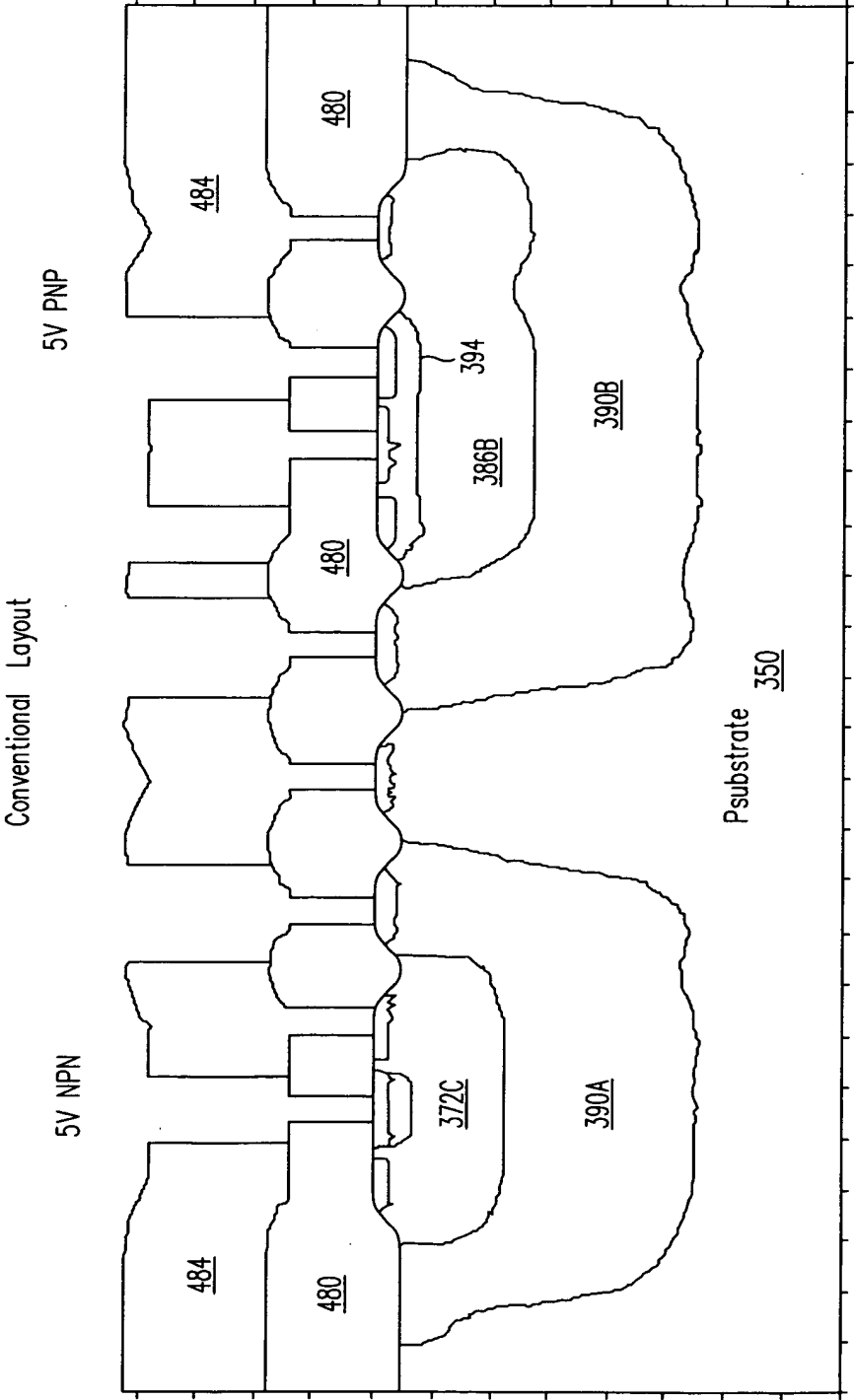
N-plug Mask and Implant

FIG. 65A



N-plug Mask and Implant

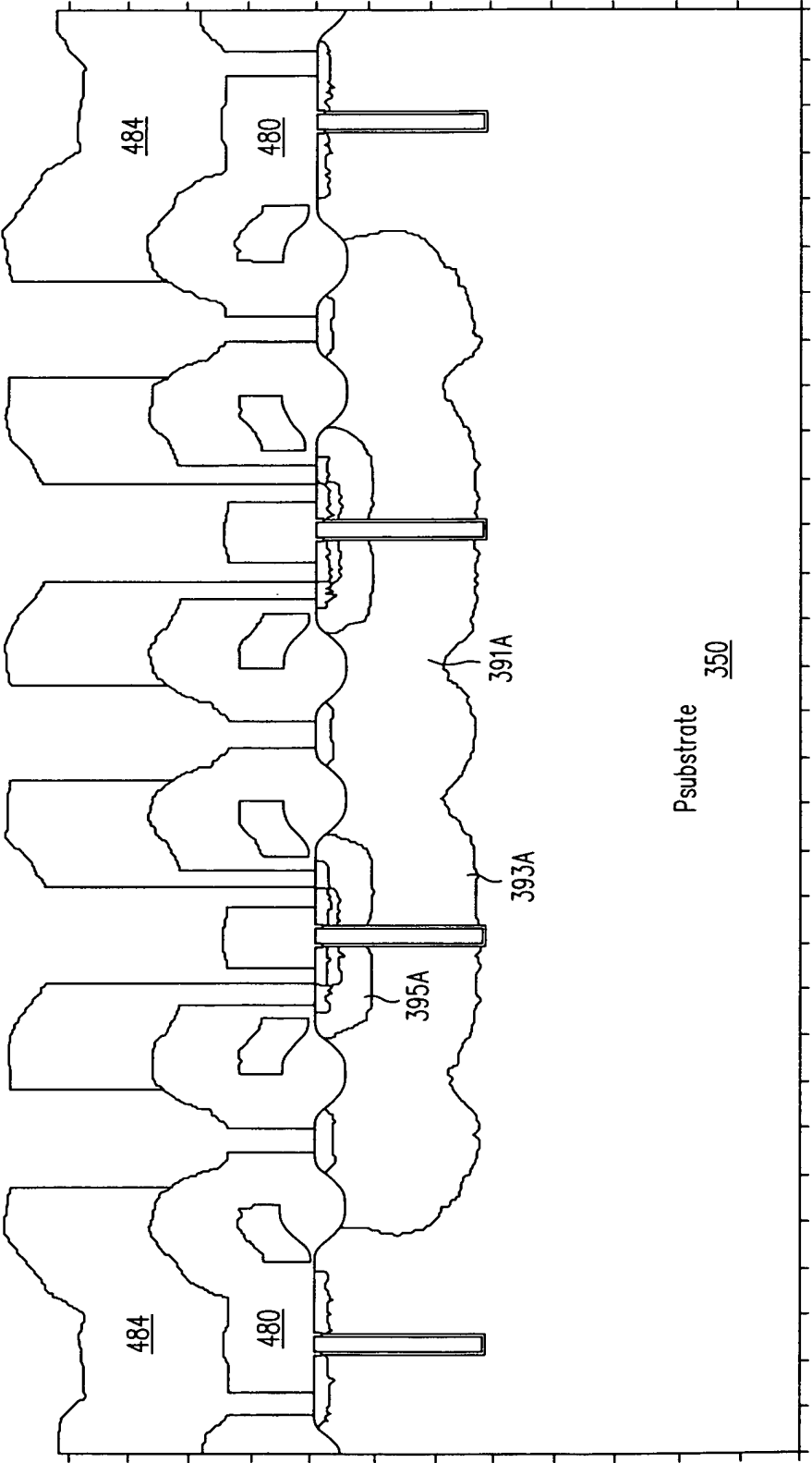
FIG. 65B



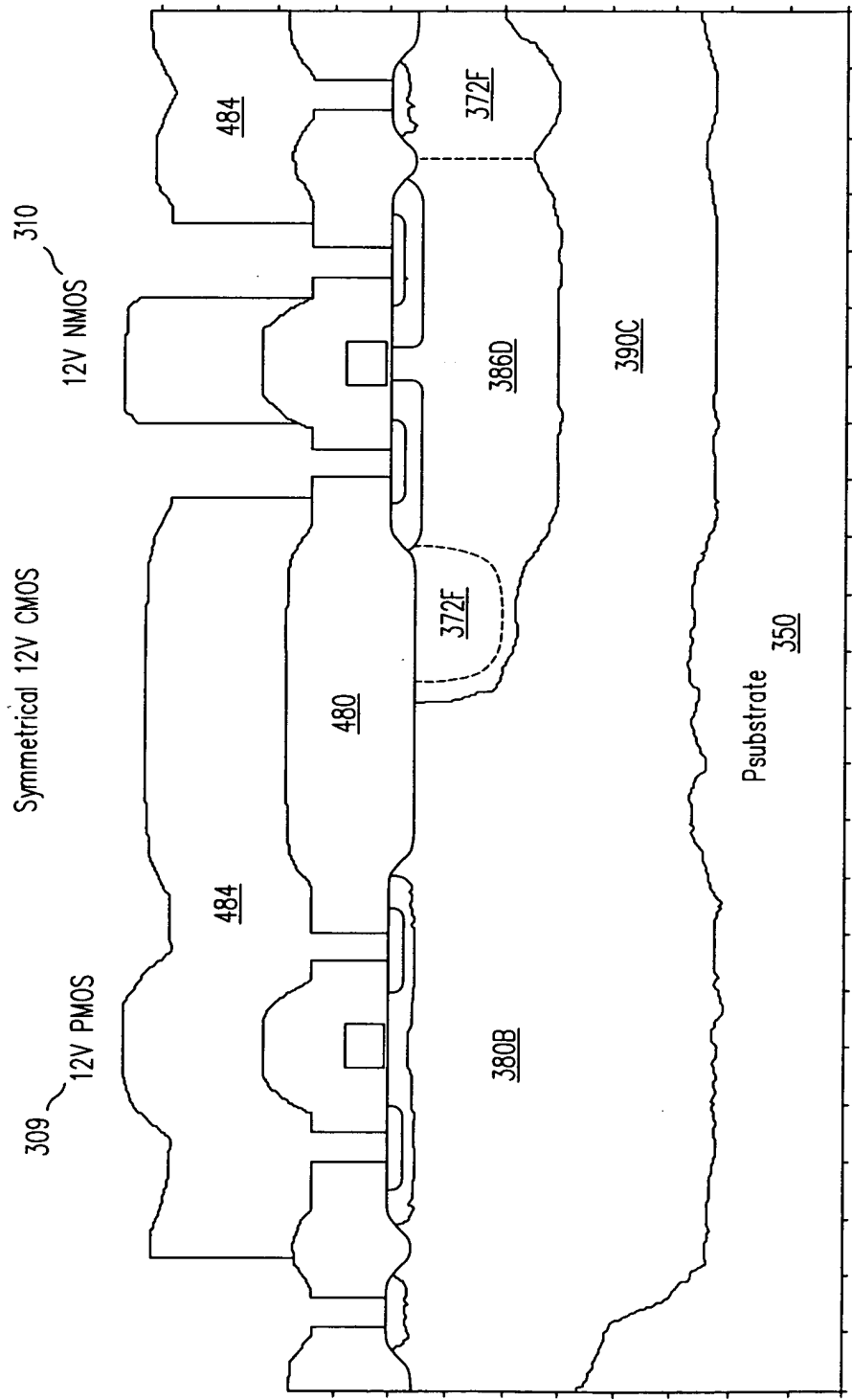
N-plug Mask and Implant

FIG. 65C

30V Lateral Trench DMOS — 308

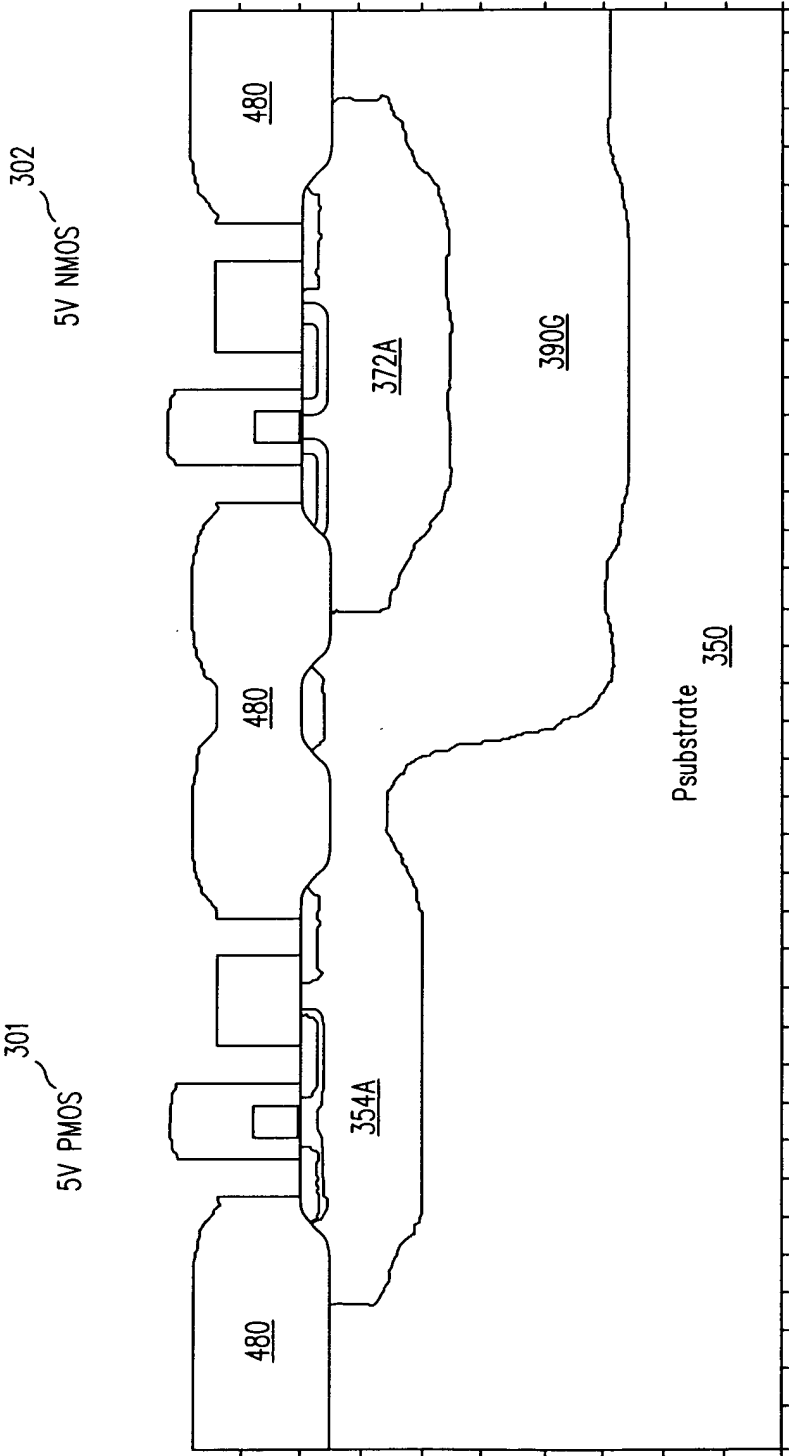


N-plug Mask and Implant
FIG. 65D



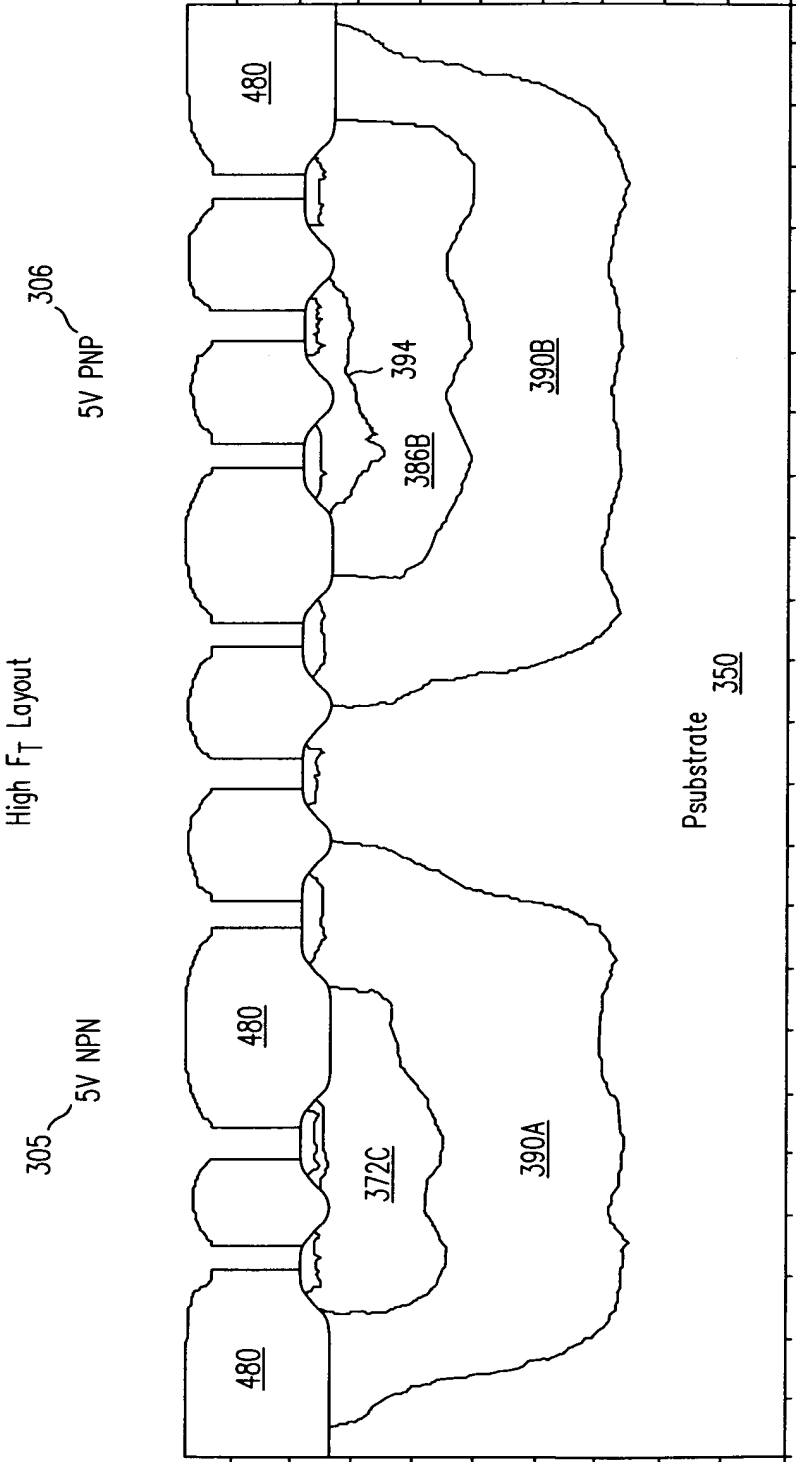
N-plug Mask and Implant

FIG. 65E



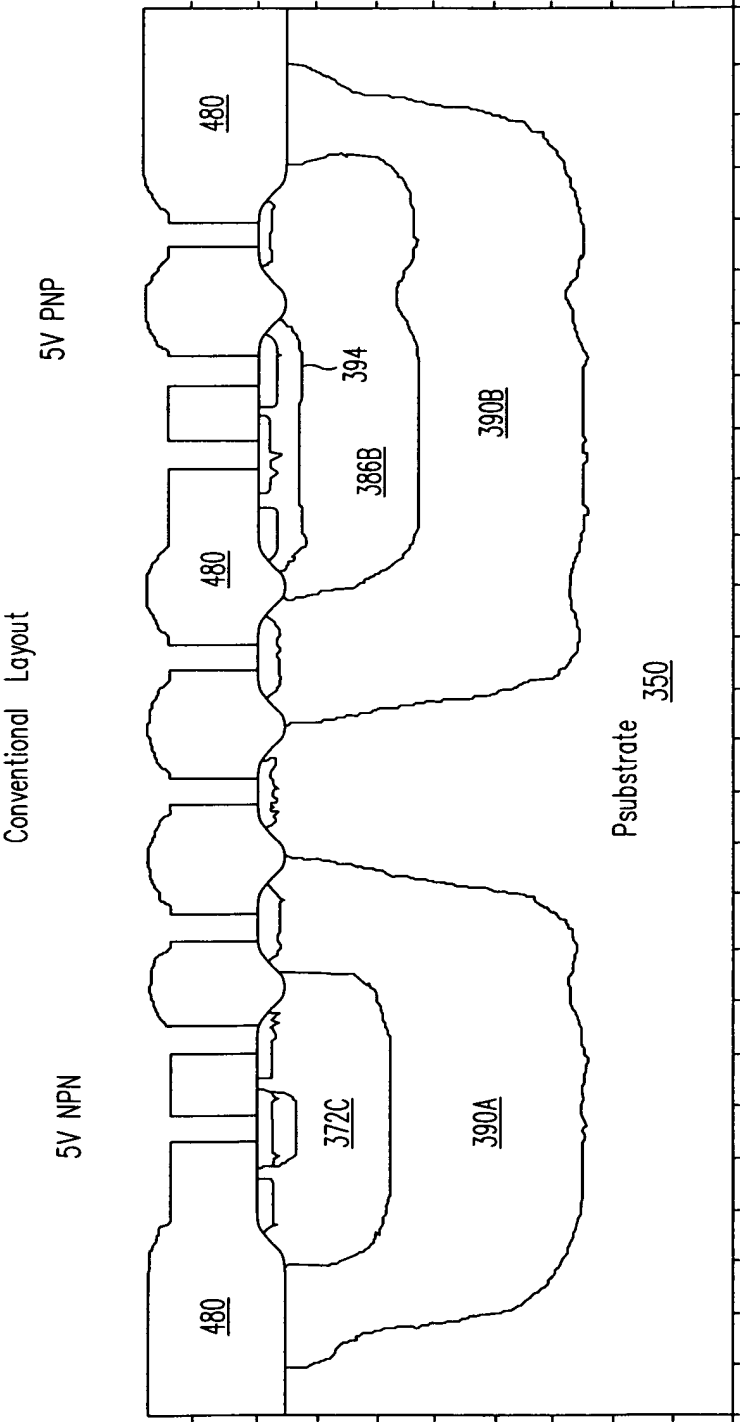
P-plug Implant

FIG. 66A



P-plug Implant

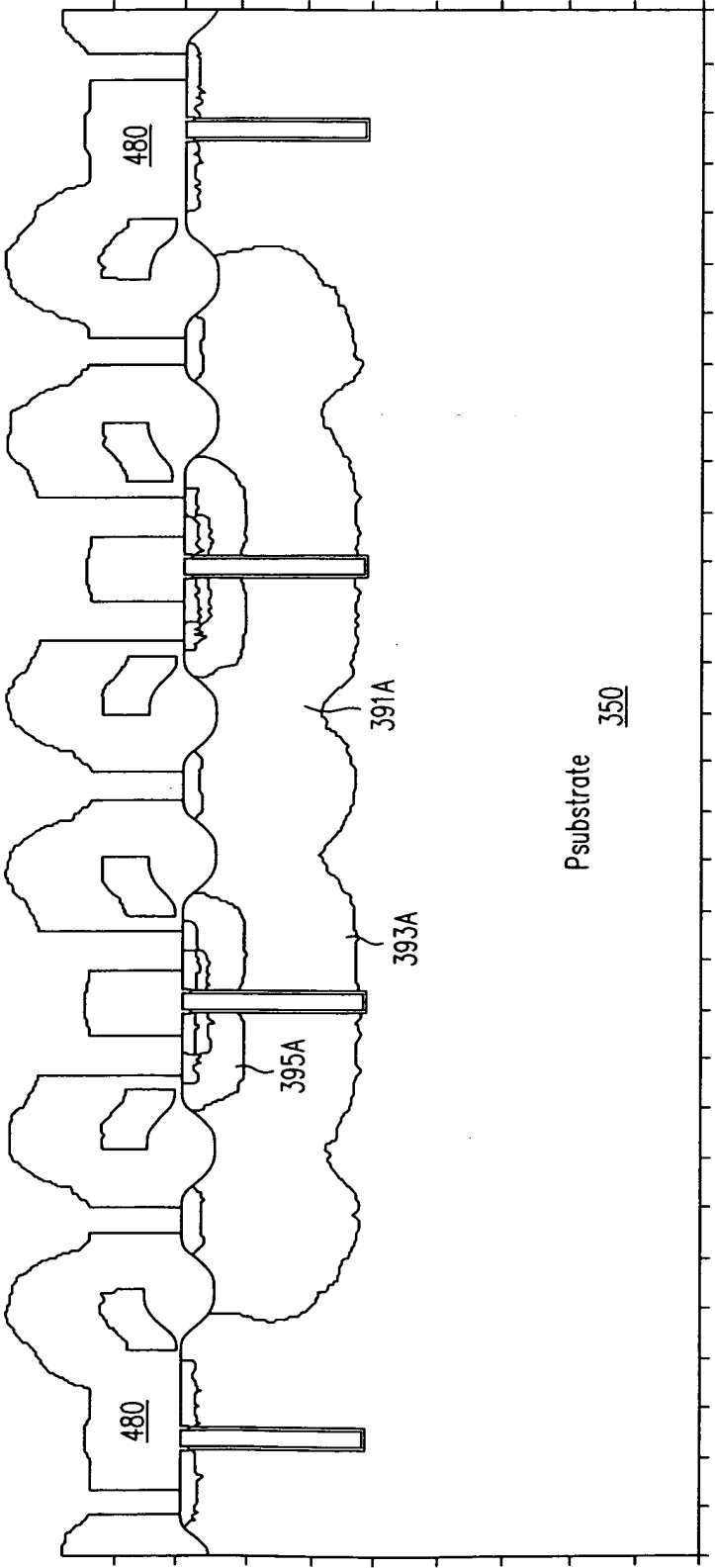
FIG. 66B



P-plug Implant

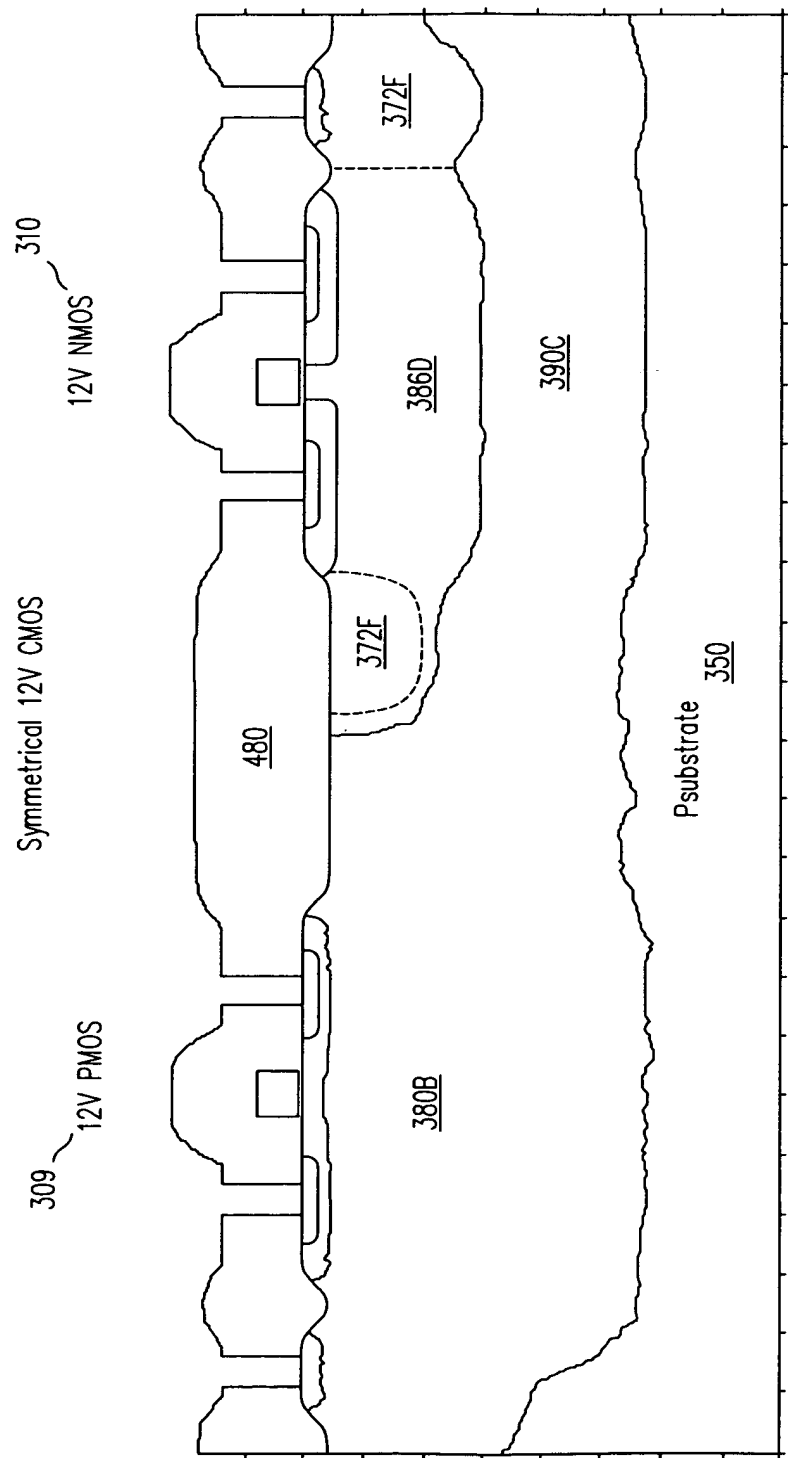
FIG. 66C

30V Lateral Trench DMOS ~ 308



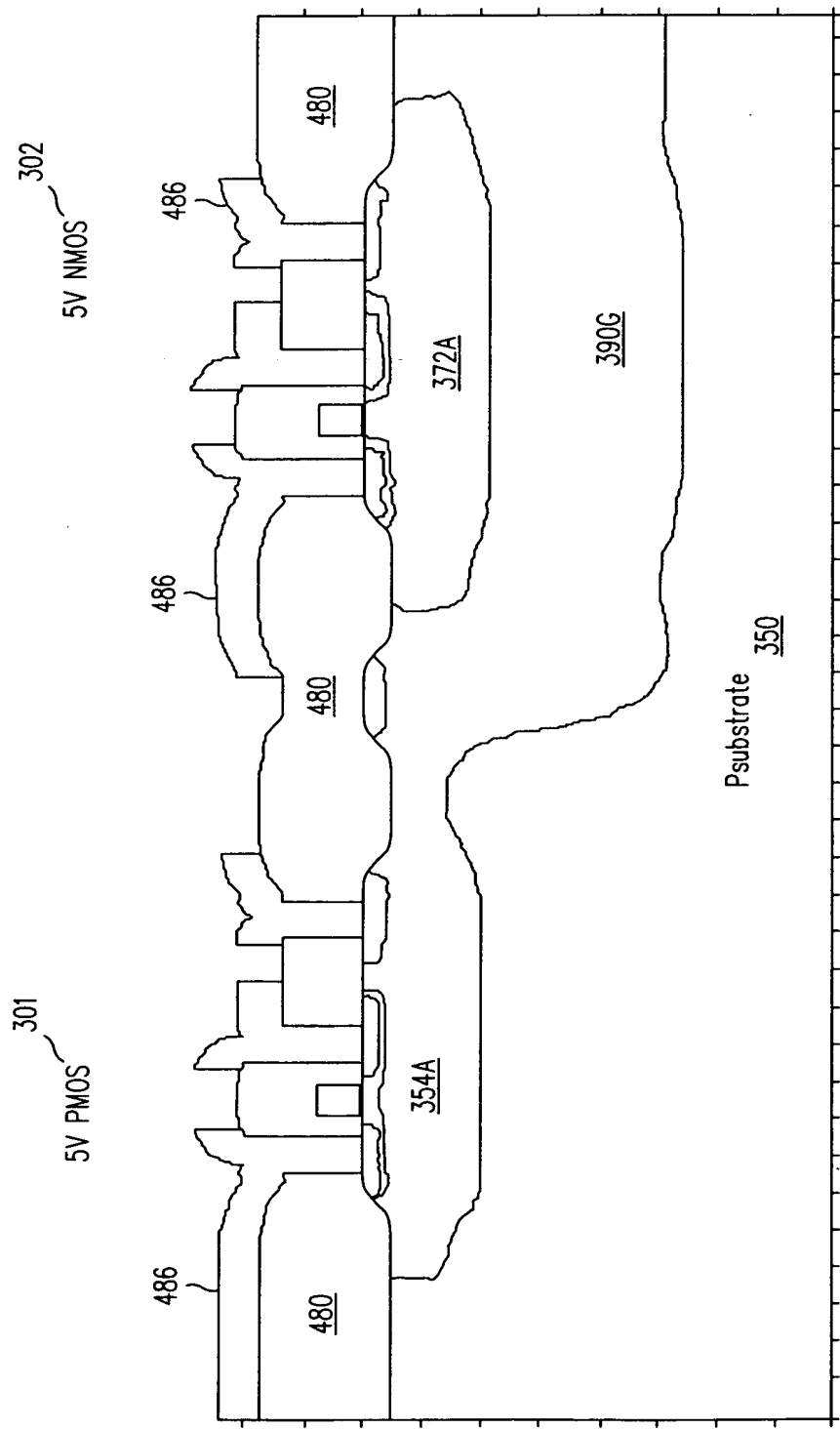
P-plug Implant

FIG. 66D



P-plug Implant

FIG. 66E



Metal Layer

FIG. 67A

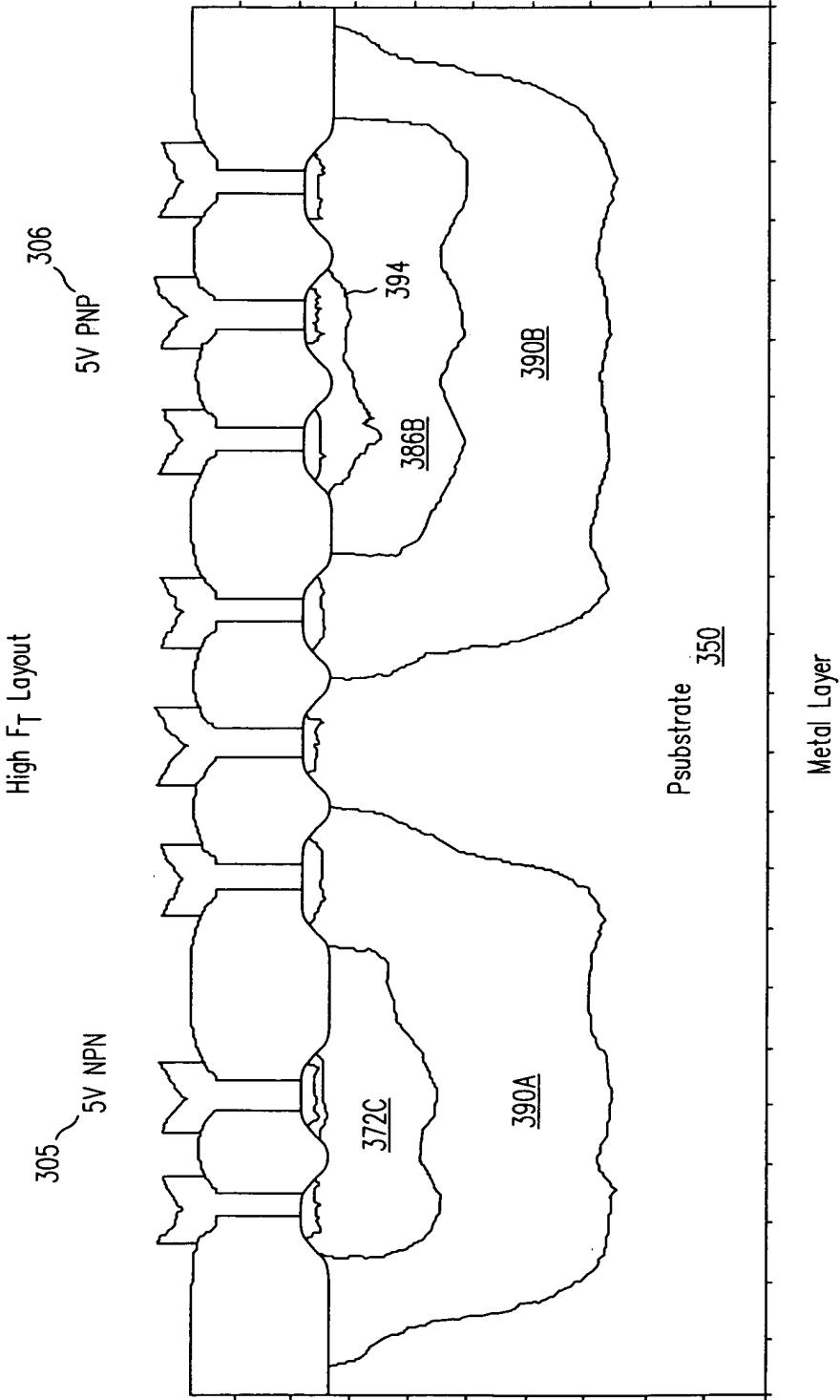


FIG. 67B

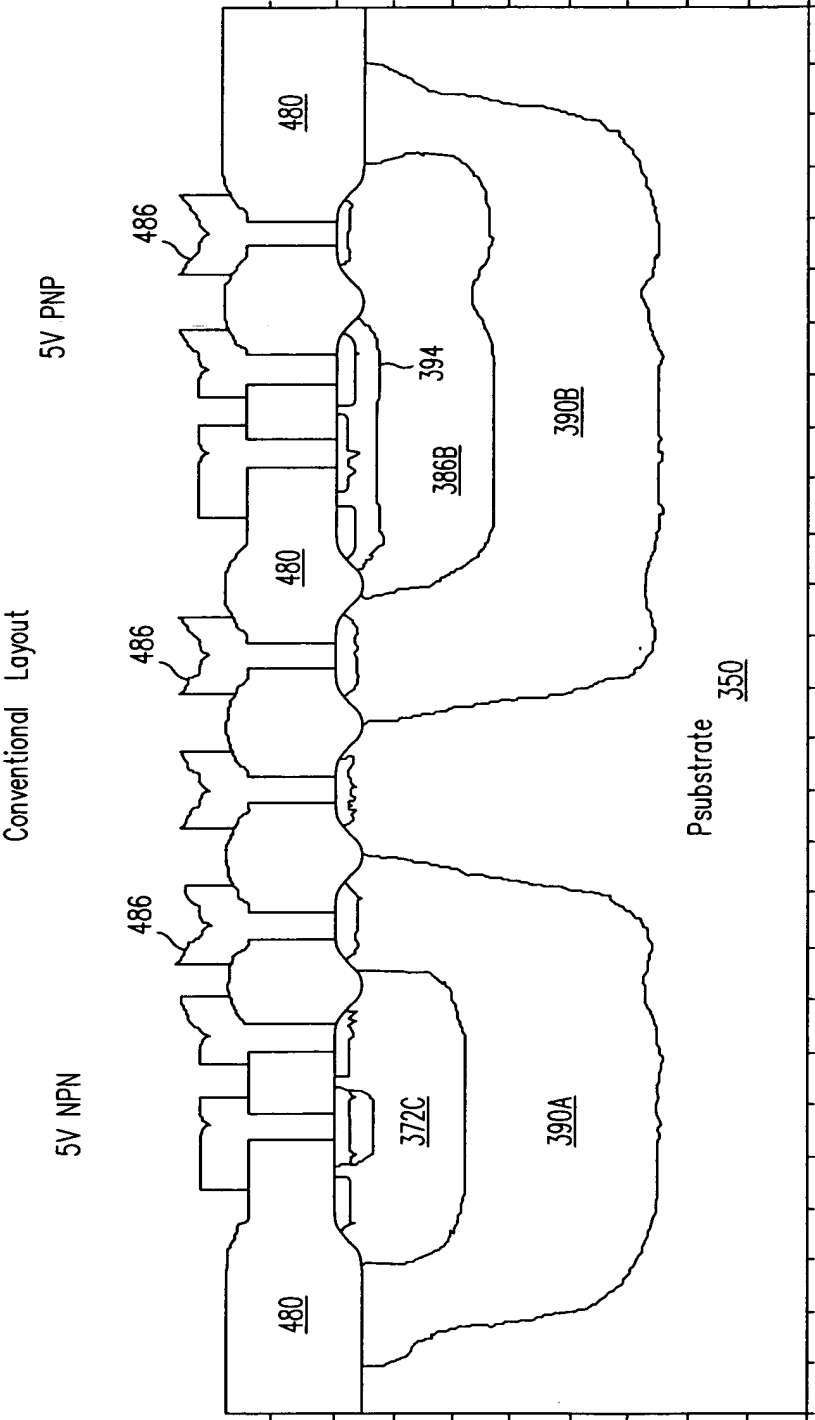
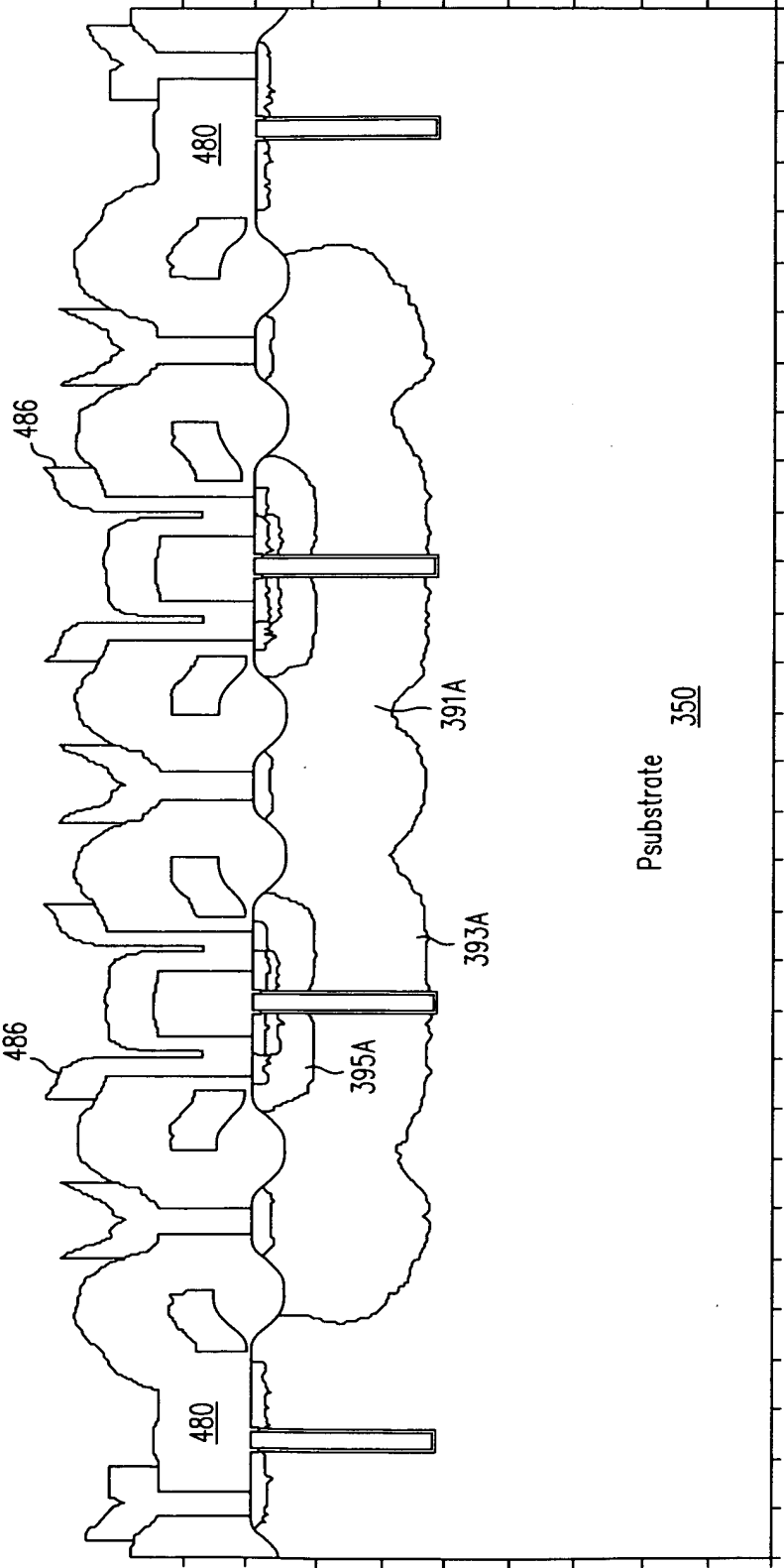


FIG. 67C

30V Lateral Trench DMOS — 308



Metal Layer
FIG. 67D

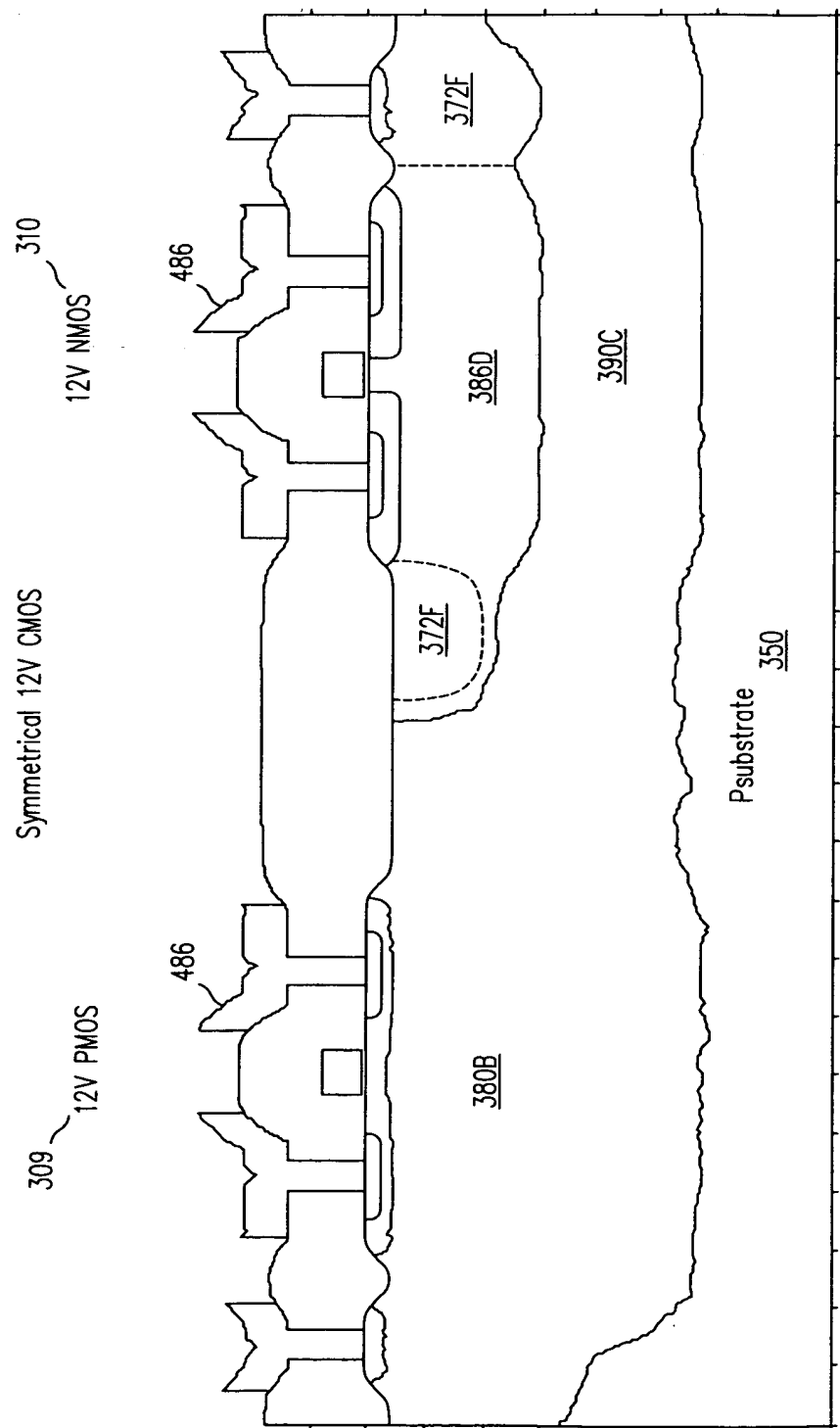


FIG. 67E

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